EFFECTIVENESS OF BEHAVIORAL TREATMENTS FOR THE REDUCTION OF NONCOMPLIANCE: A META-ANALYSIS

by

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A dissertation submitted to the faculty of
The University of Utah
in partial fulfillment of the requirement for the degree of

Doctor of Philosophy

Department of Educational Psychology

The University of Utah

May 2011

The University of Utah Graduate School

STATEMENT OF DISSERTATION APPROVAL

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ABSTRACT

A meta-analysis examining the effectiveness of treatments for noncompliant behavior in children and adolescents was conducted. Studies published in English between 1965 and 2009 were included. A total of 258 articles were included in the study; 179 single-subject studies and 79 mixed and between group design studies. The total number of participants included in the study was 6,249; 459 subjects in the single-subject component of the study with a total of 12,728 data points and 5,790 subjects in the group design component with 2,606 being part of the control group and 3,184 being part of the treatment group. All studies were examined using Hierarchical Linear Model (HLM). The overall treatment effect size for studies using HLM was -2.95 for single-subject design studies; it was 1.54 for group design studies. Both can be considered large treatment effects.

Three intervention types were examined, which included manipulation of antecedents, manipulation of consequences, and training (parent, teacher, and child). All treatment types are effective in reducing noncompliant behavior, but there was no statistically significant difference between the intervention types.

Moderator variables were examined and included diagnosis, type of noncompliance, treatment type, age, gender, treatment setting, treatment implementer, functional behavior assessment or analysis, and source of article (journal or dissertation/theses). A significant effect was found for those diagnosed with mood

disorder in single-subject studies and those diagnosed with adjustment disorder with disorder of conduct in group design studies. Both results need to be interpreted with caution due to small numbers included in the analysis. For single-subject studies both behavior momentum as a treatment type and teacher as an implementer were clinically significant. Extinction was also significant in group design studies, but must be interpreted with caution because only 1 group design study that used extinction was included in the analysis. Age was also significant in single-subject studies. It was found that every month that age increases, the treatment effect increases by 0.008 standard deviations.

A discussion of the results is provided, as well as implications for practice and research.

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ACKNOWLEDGEMENTS

There are numerous people that were instrumental in ensuring that this dissertation was completed. I would like to thank my chair, Dr. Elaine Clark, for the time and attention she has given me to make certain that my dissertation was completed. Thank you so much! Dr. Clark followed-up with me numerous times and was actively involved with me throughout this process. Dr. John Kircher's assistance with helping me set up, run, and interpret results of my meta-analysis was invaluable. I would like to thank him for all of the time he spent with me. I would also like to thank the rest of my committee, Dr. William Jenson, Dr. Dan Olympia, and Dr. James Kahn. They offered valuable information and helped make my graduate school experience a worthwhile and beneficial experience.

In addition, I need to thank Holly Majszak. She spent a great deal of time as a graduate assistant helping me sort through research and gather articles to use in my meta-analysis. Holly, it was a pleasure to work with you. Thank you for your assistance.

I also owe a great deal to my family. I want to thank my parents who encouraged me to succeed and who held education in such high esteem. I would also like to thank my family members who helped me sort through articles, read drafts, and watched my children so that I could complete me dissertation. Finally, I want to thank my husband, Jared Steffey. His support, patience, and help throughout this process has been infinite.

CHAPTER I

INTRODUCTION

Noncompliance

The behaviors that comprise noncompliance are typically identified as a broad term that can include many types of deviant behavior (Forehand & McMahon, 1981) and is manifested in a wide variety of ways (Melamed & Szor, 1999). Noncompliance is often referred to in numerous ways that include defiance, disobedience (Kalb & Loeber, 2003), oppositional behavior (Walker & Sylwester, 1998), and strong-willed behavior (Forehand & Long, 2002). Kalb and Loeber (2003) declare that although noncompliance and disobedience are usually used interchangeably, it is important to distinguish noncompliance from defiance alone. The word defiance refers to "overt behaviors such as temper tantrums and whining in response to parental requests." Noncompliance, however, is a broader term that can include such behaviors as a child ignoring a parent's wishes or commands.

Noncompliance typically refers to a "generalized behavior pattern of active resistance to rule-governed behavior (i.e., to the behavioral expectation and demands of adults)" and is also defined as the failure to comply with directives, commands, or specific requests (Walker & Sylwester, 1998). Noncompliance also involves "failure to follow a previously stated rule that is currently in effect (e.g., "You may not hit your sister")" (McMahon & Forehand, 2003, p. 2).

Many consider it important to distinguish between noncompliance and compliance. An operational definition of compliance that is often used is "appropriate following of an instruction to perform a specific response within a reasonable and/or designated time" (Schoen, 1983). It is also important to differentiate between the initiation of compliance after a command is given and when the task is completed that was specified in the command. When looking at task initiation, it is necessary to give the child enough time to comply. Time intervals for task initiation usually range from 5 to 15 seconds depending on the age of the child (Forehand, 1977).

Developmental Considerations

All children are noncompliant at some point and the expression of noncompliance can vary significantly as a function of the child's physical abilities, age, and opportunities for noncompliance (Kalb & Loeber, 2003). It has also been suggested that noncompliance can serve a purpose in the social development of children by providing a context for children to "assert their autonomy within the parent-child relationship" and "to develop social skills to express their autonomy in a socially acceptable manner" (Kuczynski & Kochanska, 1990). Although noncompliance seems to serve a purpose, the development of compliance is viewed as important because of the role it plays in a child's growth in the areas of autonomy, self-control, socialization, and the internalization of moral values (i.e., conscience) (McMahon & Forehand, 2003).

Children first seem to develop the ability to refuse to comply with parental commands when they develop motor control, and research suggests that infants who are securely attached to a parent or caregiver may be more compliant than those who are not securely attached. When a child reaches toddlerhood, during the 2nd and 3rd years of life,

they typically become increasingly noncompliant. It is at this time that a child develops autonomous thought (Kuczynski & Kochanska, 1990) and the cognitive capacity to understand requests. Toddlers also have the physical ability to carry out a parental request or command (McMahon & Forehand, 2003). Kuczynski and Hildebrandt (1997) state that "at a time that children are more and more able to comply, they become less and less willing to comply" (p. 241).

During the preschool period children gradually become more cooperative, and by the time most children enter elementary school, children are able to handle the social demands they are faced with when coming into contact with peers and other adults. However, it has been suggested that the above described developmental sequence may not hold true for clinic-referred or high-risk children.

What normal rates of compliance and noncompliance in a developing child are is difficult to answer due to the many variations in relevant parameters that occur across research studies. However, there are data that do provide some guidelines (McMahon & Forehand, 2003). In observational studies of 12 cultures conducted by Whiting and Edwards (1998), compliance rates were 72% for 2- to 3-year-olds, 79% for 4- to 5-year-olds, and 82% for 6- to 8-year-olds. Girls were generally more compliant than boys. Brumfield and Roberts (1998) report compliance rates of 32% for to 2- to 3-year-old children and 79% for 4- to 5-year-old children. Forehand (1977) noted that there is a 60-80% compliance rate in normal preschool age children and suggested that a compliance rate of less than 60% was clinically significant; however, he also noted that there is much overlap between nonclinic and clinic referred groups of children. Rhode, Jenson, and Reavis (1993) suggest that when the rate of child compliance falls below 40%, that

child's behavior may cause to be him/her to be unable to benefit from social interaction opportunities or instruction. Finally, Campbell (1995) has suggested that a definition of a disorder should contain several components:

> (1) The presence of a pattern or constellation of symptoms; (2) a pattern of symptoms with at least short-term stability that goes beyond a transient adjustment to stress or change, such as that subsequent to the birth of sibling or entry into child care; (3) a cluster of symptoms that is evident in several settings and with people other than the parent(s); (4) that is relatively severe; and (5) that interferes with the child's ability to negotiate developmental challenges, thereby reflecting some impairment in functioning. (p. 117)

The above criteria may help to make a distinction between what is normal, age-appropriate behavior that may upset adults but is reflective of age-related development transitions, and behavior that signifies potentially more serious difficulties that may eventually require attention.

The Significance of Noncompliance

Child noncompliance is a significant concern for parents, caregivers, and teachers of children. Noncompliance is consistently rated as a primary reason that parents refer their children to mental health clinics and 80-90% of parents of children referred to clinics report noncompliance in the home to be a significant problem. Teachers also report that compliance is very important in classroom situations (McMahon & Forehand, 2003). In several large surveys it was found that "child complies with teacher commands" and "follows established classroom rules" were the two most important classroom behaviors that a child can possess as rated by teachers (Walker, 1995). Compliance is also rated as a significant concern of parents and teachers of children with special needs (McMahon & Forehand, 2003).

Noncompliance has been described as a keystone behavior (McMahon &

Forehand, 2003) or a "gatekey" behavior that leads to more serious behaviors such as peer conflicts, bullying, stealing, vandalism, oppositional-defiant behavior (Walker & Sylwester, 1998), and other conduct problems. Research has also demonstrated that when clinicians target noncompliance other conduct problem behaviors improve as well (McMahon & Forehand, 2003). Furthermore, research suggests that noncompliance is correlated with aggression and antisocial behavior throughout childhood. It has also been demonstrated that there is a close association between noncompliance, aggression, and norm-breaking behavior in older children (Kalb & Loeber, 2003).

Evidence proposes that noncompliance can be manifested in a range of behavior disorders seen in childhood. McMahon and Forehand (2003) describe childhood behavioral disorders and other related conditions that are commonly associated with noncompliance taken from the current edition of the *Diagnostic and Statistical Manual of Mental Disorders* (4^{th} ed. – Text Revision) (DSM-IV-TR) and can be seen in Table 1.

Child noncompliance is particularly relevant to two diagnostic categories: Oppositional Defiant Disorder (ODD) and Conduct Disorder (CD) (McMahon & Forehand, 2003). The DSM-IV-TR describes the crucial feature of ODD as "a recurrent pattern of negativistic, defiant, disobedient, and hostile behavior toward authority figures that persists for at least 6 months" (p. 100). Diagnostic criteria are listed in Table 2. The essential feature of CD according to the DSM-IV-TR is "a repetitive and persistent pattern of behavior in which the basic rights of others or major age-appropriate societal norms or rules are violated" (p. 93). Diagnostic criteria are listed in Table 3.

Oftentimes, if a child presents with noncompliance that is accompanied by conduct problems where a major violation of rules and societal norms occurs and is

Table 1. DSM-IV Child Behavior Disorders and Related Conditions Associated With Child Noncompliance

Primary Disorders	
Oppositional Defiant Disorder	Adjustment Disorder with Disorder of Conduct
Conduct Disorder	Adjustment Disorder with Mixed Disturbance of Emotions and Conduct
Attention-Deficit Hyperactivity Disorder	Disruptive Behavior Disorder Not Otherwise Specified
Related Conditions	
Child or Adolescent Antisocial Behavior	Noncompliance with Treatment
Parent-child Relational Problem	Problems Related to Abuse or Neglect
Sibling Relational Problem	
Other Disorders	
Mood Disorders	Encopresis
Psychotic Disorders	Mental Retardation
Enuresis	Autistic Disorder

Table 2. DSM-IV-TR Diagnostic Criteria for Oppositional Defiant Disorder

A. A pattern of negativistic, hostile, and defiant behavior lasting at least 6 months, during which four (or more) of the following are present:

(1) often loses temper
(2) often argues with adults
(3) often actively defies or refuses to comply with adults' requests or rules
(4) often deliberately annoys people
(5) often blames others for his or her mistakes or misbehavior
(6) is often touchy or easily annoyed by others
(7) is often angry and resentful
(8) is often spiteful or vindictive

Note: Consider a criterion met only if the behavior occurs more frequently than is typically observed in individuals of comparable age and developmental level

B. The disturbance in behavior causes clinically significant impairment in social, academic, or occupational functioning.

C. The behaviors do not occur exclusively during the course of Psychotic or Mood Disorder.

D. Criteria are not met for Conduct Disorder, and, if the individual is age 18 years or older, criteria are not met for Antisocial Personality Disorder

Table 3. DSM-IV-TR Diagnostic Criteria for Conduct Disorder

A. A repetitive and persistent pattern of behavior in which the basic rights of others or major age-appropriate societal norms or rules are violated, as manifested by the presence of three (or more) of the following criteria in the past 12 months, with at least one criterion present in the past 6 months:

Aggression to people and animals

(1) often bullies, threatens, or intimidates others
(2) often initiates physical fights
(3) has used a weapon that can cause physical harm to others (e.g., a bat, brick, broken bottle, knife, gun)
(4) has been physically cruel to people
(5) has been physically cruel to animals
(6) has stolen while confronting a victim (e.g., mugging, purse snatching, extortion, armed robbery)
(7) has forced someone into sexual activity

Destruction of property

(8) has deliberately engaged in fire setting with the intention of causing serious damage
(9) has deliberately destroyed others' property (other than by fire setting)

Deceitfulness or theft

(10) has broken into someone else's house, building, or car
(11) often lies to obtain goods or favors or to avoid obligations (i.e., "cons" others)
(12) has stolen items of nontrivial value without confronting a victim (e.g., shoplifting, but without breaking and entering; forgery)

Serious violations of rules

(13) often stays out at night despite parental prohibitions, beginning before age 13 years
(14) has run away from home overnight at least twice while living in parental or parental surrogate home (or once without returning for a lengthy period)
(15) is often truant from school, beginning before age 13 years

B. The disturbance in behavior causes clinically significant impairment in social, academic, or occupational functioning.

Table 3 Continued

C. If the individual is age 18 years or older, criteria are not met for Antisocial Personality Disorder

Code based on age of onset:

312.81	**Conduct Disorder, Childhood-Onset Type:** onset of at least one criterion characteristic of Conduct Disorder prior to age 10 years
312.82	**Conduct Disorder, Adolescent-Onset Type:** absence of any criteria characteristic of Conduct Disorder prior to age 10 years
312.83	**Conduct Disorder, Unspecified Onset:** age at onset is not known

Specify severity:

Mild:	few if any conduct problems in excess of those required to make the diagnosis **and** conduct problems cause only minor harm to others
Moderate:	number of conduct problems and effect on others intermediate between "mild" and "severe"
Severe:	many conduct problems in excess of those required to make the diagnosis **or** conduct problems cause considerable harm to others

related to some sort of stressful event that has occurred in the past 3 months, then a diagnosis using one of the adjustment disorder categories is often made. Children are frequently diagnosed with Disruptive Behavior Disorder Not Otherwise Specified when criteria are not met for ODD or CD but when a child has a number of oppositional or conduct behavior problems. Children are typically 3-4 years of age when diagnosed with Disruptive Behavior Disorder Not Otherwise Specified. Also, when children are presenting with noncompliant behavior as a primary problem, there are several conditions listed in the DSM-IV-TR that are not "mental disorders" but may be relevant. These include child or adolescent antisocial behavior, parent-child relational problem, sibling relational problem, noncompliance with treatment, and problems related to abuse or neglect. Finally, noncompliance can be associated with mood disorders, enuresis, encopresis, developmental disabilities such as autism and mental retardation, and psychotic disorders. Although noncompliance is not an essential feature of these disorders it may be severe enough to warrant intervention (Mahon & Forehand, 2003).

Types of Noncompliance

Four types of noncompliance typically occur in adult and child interactions and reflect varying degrees of developmental sophistication. They include direct defiance, passive noncompliance, simple refusal, and negotiation. Direct defiance and passive noncompliance are seen as the least sophisticated developmental strategies and seem to be predictive of externalizing problem behavior at the age of 5. Negotiation is seen as the most developmentally sophisticated developmental strategy (Kuczynski, Kochanska, Radke-Yarrow, & Girnius-Brown, 1987). Slowness to respond (Mace et al., 1988) and whining have also been described as types of noncompliance (Kuczynski et al., 1987).

Direct defiance typically refers to noncompliance that is accompanied by poorly controlled anger, hostility, defiance of adult authority, negative affect, and occasional attempts to intimidate the adult or person who issued the directive (Walker & Sylwester, 1998). This type of noncompliance causes strong emotion and often results in an escalating chain of shared social exchanges that can develop into hostile confrontations once they are initiated (Colvin, 1993). In this type of noncompliance, an adult gives a command, usually in an emotionally charged atmosphere. The child responds by refusing to carry out the request, generally in a hostile or angry manner. The adult then typically repeats the command in a more forceful manner, and the child matches or exceeds the adult's emotional intensity and still refuses to carry out the command (Walker & Sylwester, 1998). This pattern of interaction is known as the coercive process. The outcome of this process usually results in the adult's withdrawal of the command, whereby the child is reinforced by the withdrawn direction, or the child complies and the adult is reinforced for issuing the command or direction in an angry manner (Forehand & Long, 2002).

Passive noncompliance occurs when the child does not overtly refuse to perform a requested behavior, but still refuses to comply with the adult's request. In passive noncompliance the child will often ignore the adult and does not acknowledge that a directive has been issued. This type of noncompliance is typically not accompanied by hostility, defiance, or anger (Walker & Sylwester, 1998).

Simple refusal is typically considered less aversive than direct defiance (Kuczynski et al., 1987) because it is communicated without negative emotion or anger. Simple refusal occurs when an adult issues a command, the child acknowledges a

directive has been issued (e.g., the child may say, “No,” “Uh-uh,” or “Sorry, I can’t”), but the command or directive is not followed or carried out by the child. Simple refusal has the potential to escalate into anger and hostility if the adult insists the directive is carried out and the child continues to refuse.

Negotiation occurs when a child tries to get an adult to modify or withdraw a command. This type of noncompliance is typically considered to be nonaversive (Kuczynski & Kochanska, 1990) and a rather sophisticated form of noncompliance (Walker & Sylwester, 1998). When a child attempts to negotiate, they may make excuses. The child will typically tell the adult why they cannot follow a command with a “because” statement. For example, they might say I cannot do that because, “I am too little,” “it is already clean,” or “I am not hungry.” A child may also attempt to bargain as a form of negotiation by trying to change, limit the terms of a command, or mitigate. This may be accompanied by an “If-then” statement. For example, the child may say, “If I can have a cookie, then I will do that.” The child may also request an adult’s help or ask why when negotiating by bargaining (Kuczynski & Kochanska, 1990).

Whining is also occasionally cited as a response strategy and a common form of noncompliance in children. When a child responds by whining, a child’s response to a request typically goes with an aversive and/or pleading tone of voice (Kuczynski et al., 1987).

Finally, slowness to respond to commands or to complete assigned tasks is a variation of noncompliance. This type of noncompliance can be problematic because persons who are exceedingly slow to respond may receive punitive social responses from adults as well as less positive reinforcement than their peers (Mace et al., 1988).

Treating Noncompliance

Practitioners are constantly looking to find valid and effective interventions to treat maladaptive behaviors in children, including noncompliance (Killu, Sainato, Davis, Ospelt, & Paul, 1998). Effective treatment techniques are important because noncompliant behavior can have a profound negative influence on personal, social, academic, and vocational success (Lee, 2005).

Four possible treatment approaches to treating noncompliance have been described by Engelmann and Colvin (1983). The first is called the "medical approach" and is based on the hypothesis that noncompliance is a behavioral symptom of a physical disorder that must be treated through a medical approach. The second is termed the "developmental approach." This approach views noncompliance as the product of an interaction between the maturity level of an individual and the individual's experience. This approach attempts to treat noncompliance through the control of an individual's experiences. The "contingency-management approach" is the third approach. This approach assumes that noncompliance persists because it is reinforced. Compliance can therefore be increased if the consequences of noncompliance and compliance are controlled. The final approach is called the "direct-instruction approach." It is considered an extension of the contingency-management approach. Inappropriate learning is considered to be the cause of noncompliance in this case and suggests that noncompliance can be controlled through antecedent events. Often the antecedent events are coupled with consequences. It is believed that antecedent event control, coupled with consequences when necessary, will teach individuals the skills needed for compliance. The efficacy of the first two approaches has not been studied empirically and treatment

usually makes use of a combination of the latter two approaches by combining three possible strategies: (1) manipulation of the antecedents, (b) manipulation of the behavior, or (3) manipulation of the consequences.

Manipulation of Antecedents

The manipulation of antecedent events can provide an intervention that is easy to implement and simple. Methods that prevent noncompliance may produce long lasting results and may be more efficient than other forms of treatment (Lee, 2005). There are numerous antecedent events that have been demonstrated to decrease noncompliance and increase compliance. Effective instruction delivery (EID), which includes gaining eye contact before giving a command and providing praise for eye contact, delivering the command in close proximity to the recipient, and allowing for a 5-second wait period for a response, are some ways in which compliance can be increased (Benoit, Edwards, Olmi, Wilczynski, & Mandal, 2001). Nonverbal behaviors of the command giver have also been shown as an effective way to increase compliance. Nonverbal behaviors include things such as body orientation, distance from the child, voice tone (Hudson & Blane, 1985), and voice volume (Saltz, Campbell, & Skotko, 1983). Light physical touch on the arm (Patterson, Powell, & Lenihan, 1986; Willis & Hamm, 1980), guided compliance (Wilder & Atwell, 2006), and pretask requests have also been shown to increase compliance (Lee, 2005).

Dimensions of commands. Pretask requests have been described as proactive or antecedent strategies to aid compliant responding (Killu, 1999). Two basic types of commands have been described in the literature: alpha directions, effective commands, and beta directions, or ineffective commands (Forehand & Long, 2002).

A number of beta directions or ineffective command types have been described. Forehand and Long (2002) describe beta directions and their likely consequence. Beta directions include chain directions, vague directions, question directions, "Let's" directions, and directions followed by a reason (Table 4).

Forehand and Long (2002) also describe alpha directions or effective directions. Alpha directions are clear and simple. Significant components of effective commands include getting a child's attention and making eye contact before giving a direction, using a firm voice that is not loud or gruff, and directions that are specific and simple and may include physical gestures such as pointing. Effective directions may also include positive directions which are commands that use "do" this instead of "don't" do that. Antecedent interventions may also include initiating versus terminating types of commands (Walker & Sylwester, 1998) and behavioral momentum which consists of strategies to which an individual will most likely comply, which include high-probability versus low-probability commands (Mace et al., 1988).

Issuing initiating versus terminating commands is another way to prevent noncompliance. A terminating command typically directs an individual to terminate an action and may include a directive such as, "John, stop messing around and clean up." Terminating commands often add an unnecessary secondary command to the chief command and are usually perceived as negative by the recipient. An initiating command is one in which an adult gives a directive to initiate an action. For example, an initiating command may include a statement such as this, "Please help John find his pencil and paper." An initiating command usually results in a greater rate of compliance than does a terminating command (Walker & Sylwester, 1998).

Table 4. Beta Directions

Type of Direction	**Definition**	**Likely Consequences**
Chain Direction	Direction that involves numerous steps.	A child may not be able to remember all the things that he/she was told to do and therefore may not follow such a direction.
Vague Direction	Direction that is not clear and may be interpreted by a child in a different way than was intended. For example, "Be good," can things in different situations.	A child may not be able to correctly interpret and follow the direction. Being "good" in one situation may mean different staying seated at the table; in another it may mean not hitting your sister.
Question Direction	Direction in the form of a question, which gives the child the option of saying "No."	Asking a child to do something may sound less authoritarian, but it places the adult in the position of having to accept "No" as an answer.
"Let's" Direction	Direction that includes the adult in completing the task when the adult intends for the child to complete the task alone.	Child feels tricked and increases noncompliance.
Direction Followed by a Reason	Reason given after a direction.	A reason after a direction can distract a young child from complying. If an adult wants to use a reason, it should be short and given before the direction.

Behavioral momentum is described as the "tendency for behavior to persist following a change in environmental conditions" (Mace et al., 1988, p. 123). Behavioral momentum was a term first described by Nevin, Mandell, and Atak (1983) who borrowed the term "momentum" from physics. The first experiments on behavioral momentum with human subjects were carried out by Mace et al. (1988). These researchers demonstrated that behavioral momentum could be applied successfully with noncompliance as well as with other behaviors. Commenting on behavioral momentum, Belfiore, Lee, Scheeler, and Klein (2002) imply that compliance with an easy-hard task sequence appears to reduce resistance to compliance with difficult tasks thereby establishing momentum within a group or response class of behaviors. Throughout the past approximately 15 years a great deal has been written about high-probability (high-*p*) versus low-probability (low-*p*) requests (Lee, 2005) and research has demonstrated the success of using a series of high-*p* requests to influence the likelihood that an individual will comply with a low-*p* request (Killu, 1999). A high-*p* request is one that consists of issuing a series of two to three easy high-*p* tasks, with which the individual has a history of compliance with prior to delivering a low-*p* request, or one that may be followed by noncompliant behavior (Banda & Kubina Jr., 2006). Compliance to high-*p* and low-*p* requests is generally followed by reinforcement (Killu, 1999).

Manipulation of Behavior

It is difficult to investigate manipulation of behavior due to problems with definition and therefore, few studies have been attempted. However, some research has been done. Neville and Jenson (1984) trained a child to say "Sure I will," following any command. They were able to demonstrate in this way that noncompliance decreases

when a child is trained to respond to a command with a behavior that is topographically incompatible with noncompliance.

Manipulation of Consequences

Many treatment programs attempt to modify the consequences that a child experiences based on the response of the child to the command (Forehand, 1977). Various types of consequences have been described in the literature and include reinforcement procedures, extinction procedures, and punishment or aversive procedures (Engelmann & Colvin, 1983)

Reinforcement procedures. Positive and negative reinforcement have been described in the literature as ways to increase compliance and decrease noncompliance. Reinforcement means "strengthening a response (increasing its rate)." Positive reinforcement strengthens a response by adding positive consequences such as praise, attention, or food. Negative reinforcement strengthens a response by removing an unpleasant or aversive stimulus (Crain, 2000).

When dealing with noncompliance, reinforcement procedures are often accompanied by other procedures such as antecedent events, guided compliance, and time-out. Positive reinforcement is a helpful tool when trying to increase compliance rates and decrease noncompliance. McMahon and Forehand (2003) describe positive reinforcement and state that "when a behavior receives positive consequences immediately after it occurs, that behavior is more likely to occur in the future" (p. 109). One tool that often accompanies positive reinforcement is known as differential attention, which is, as McMahon and Forehand (2003) state, the "application of adult attention following the occurrence of a desired behavior and the removal of an adult's attention

after an undesired behavior" (p. 109). Adult attention serves as the positive reinforcer (Forehand & McMahon, 1981).

Time-in is another positive reinforcement program that emphasizes verbal praise and physical touch. It is often combined with the use of time-out to reduce noncompliant behavior (Marlow, Tingstrom, Olmi, & Edwards, 1997).

Extinction procedures. Extinction is "a decrease in the tendency to perform a response brought about by unreinforced consequences of the response" (Santrock & Yussen, 1992, p. 227). Like reinforcing procedures, extinction is typically accompanied by other methods to decrease noncompliance. For example, in a study conducted by Everett et al. (2007) extinction was used with time-out to treat escape-maintained noncompliance.

Punishment/aversive procedures. Punishment is a "consequence that decreases the probability that a behavior will occur" (Santrock & Yussen, 1992, p. 226). Punishment and aversive techniques are often used to decrease noncompliance, but are often combined with other techniques such as positive reinforcement.

Time-out is a frequently used behavior management technique and is a shortened version of the phrase "time-out from positive reinforcement." Time-out is a method in which positive reinforcement is withheld from an individual for a certain amount of time (Marlow et al., 1997). Experts typically recommend that time-out be used with behaviors that are maintained by positive reinforcement and advise against using time-out when a behavior is escape maintained. Time-in is often used with time-out to decrease noncompliance (Everett et al., 2007).

Other interventions. Parent training has been applied to a wide variety of

childhood behavior disorders including noncompliance. Parent training is defined as "procedures by which parents are trained to alter their child's behavior in the home. The parents meet with a therapist or trainer who teaches them to use specific procedures to alter interactions with their child, to promote prosocial behavior, and to decrease deviant behavior" (McMahon & Forehand, 2003, p. 20).

Other methods that have shown to be useful include offering a child a choice, changes in schedules and curricula, environmental modifications, changes in staffing ratio, staff training in positive behavior supports (Singh et al., 2006), and developmental control strategies (Kuczynski et al., 1987).

Functional Behavior Assessment

In order to treat challenging behaviors successfully, it is often necessary to assess what maintains these problem behaviors or to discover why these behaviors occur. To determine why a problem behavior is occurring or what function a behavior serves, researchers determine the antecedents and consequences of the behavior. Two methods are utilized to analyze the antecedents and consequences of behavior and include functional behavior assessment (Scott, Nelson, & Zabala, 2003) and functional analysis. The expression functional analysis describes cause and effect relationships between behavior and the environment. It includes the direct observation and measurement of a specific behavior while an environmental variable is being manipulated. It is conducted under at least two conditions so that a relationship between the environmental event and the behavior can be found and treatments can be implemented that will be effective (Hanley, Iwata, & McCord, 2003).

Like functional analysis, functional behavior assessment involves identifying

relationships between behavior and the environment to determine the function of the behavior. However, functional behavior assessment does not involve the direct manipulation of environmental variables (Reese, Richman, Zarcone, & Zarcone, 2003). Scott et al. (2003) describe functional behavior assessment as "a process of assessing the purpose or function of behavior in relation to its context (i.e., surrounding environment) so that appropriate interventions can be designed to meet his or her unique needs" (p. 216). One of the major advantages of using this type of approach is that challenging behaviors can be dealt with through the development of proactive and preventative individualized behavior support plans. Reese et al. (2003) state that "based on the results of a functional assessment, treatment components can be selected that focus on modifying the environment and teaching appropriate behaviors that serve the same function as the individual's challenging behavior" (p. 87).

Functional analyses and functional assessments have been used in a number of studies focusing on decreasing challenging behaviors in children with autism (Reese et al., 2003). These methods have helped researchers and professionals better understand and categorize stimuli that reinforce and maintain certain behaviors (Richman, Wacker, Asmus, Casey, & Andelman, 1999). However, the use of functional behavior assessments has recently been called into question. In a study conducted by Gresham et al. (2004) it was found, after examining 150 studies, that school-based interventions based on the results of functional behavior assessments were no more effective than interventions that were not based on this type of assessment. Therefore, based on these varying views, more research is needed before it is possible to positively state what the specific advantages and/or disadvantages are to using functional analyses and functional

behavior assessments to plan interventions for challenging behavior.

Meta-analysis

One type of study that attempts to synthesize data is the qualitative literature review. Scientists using this method draw up a list of relevant studies, examine each study for "methodological adequacy," and then count the number of studies which support and do not support a given relationship. These types of studies have been criticized for falling short in three particular areas: "first, some information is ignored; second, the sample of studies may be biased; and third, statistical interactions may not be detected" (Cook & Leviton, 1980, p. 453). Qualitative literature reviews have also been criticized for imprecision, neglect of important information contained in the original studies, and subjectivity (Strube & Hartmann, 1983).

Because of the apparent inadequacy of qualitative literature review, researchers have begun to use more quantitative procedures when analyzing data. One such quantitative method, which is being used much more frequently, is the meta-analysis (Strube & Hartmann, 1983). Gene Glass (1976) introduced the term meta-analysis and refined the technique with literature reviews, even though he acknowledged that a variety of meta-analytic techniques had been used by researchers in the past. A meta-analysis, also known as an integrative review, is "primarily interested in inferring generalizations about substantive issues from a set of studies directly bearing on those issues" (Bangert-Drowns, 1986, p. 388). Lipsey and Wilson (2000) describe the meta-analysis as a form of survey research in which rather than survey people, research reports are surveyed. Individual studies are collected on a certain topic. Researchers then code the proper information concerning the quantitative findings and the characteristics of the studies.

Meta-analyses have also been described as a method that synthesizes general research and thereby provides a more general picture of the effectiveness of an intervention (Mathur, Kavale, Quinn, Forness, & Rutherford Jr., 1998). Bliming (1988) stated that there are four general purposes of meta-analyses. They are: 1) to describe a body of research, 2) to summarize the overall effect of a given treatment, 3) to identify variables that influence treatment outcomes, and 4) to quantify the effect of treatment.

Once all of the appropriate information from the studies has been collected, the information is then extracted and the statistics of each study are reduced into a common metric referred to as the effect size (ES). Effect size is the basic unit of observation in a meta-analysis. It is "an index of the magnitude of the effect of one variable (or set of variables) on another variable (or set of variables)" (Allison & Gorman, 1993, p. 621). The ES statistic represents the findings of quantitative research in a form that allows different statistical techniques to be represented and carried forward for analysis. An ES makes possible the comparison of various forms of quantitative study findings because it is based on standardization, which produces consistency in findings across all measures. Effect size statistics also provide both the magnitude and direction of a relationship as well as its significance (Lipsey & Wilson, 2000). Consequently, meta-analysis research includes defining the empirical question, collecting all applicable studies, transforming the outcomes of all studies into a common metric (ES) to allow comparisons to be made across the dependent measures, and describing the average outcome of the studies. Two basic advantages to using ES have been described and include their lack of dependence on sample size and the significant expression an ES gives to the magnitude of an effect. "Effect sizes are considered the exact equivalent of z scores, with 1.0 being one standard

deviation from the statistical mean of the standard normal distribution" (Jenson, Clark, Kircher, & Kristjansson, 2007, p. 484).

Once an ES is calculated separately for each study included in the meta-analysis, it can be determined whether the ES favored the experimental group or the control group. Positive ES values are associated with results favoring the experimental (posttest) group, and negative values are associated with results favoring the control (pretest) group (Wolfe, 1986). The ES that result can then be averaged across studies. Additionally, other significant relationships between independent variables and dependent measures can be searched for by coding each study on quantitative dimensions such as the age of subjects and categorical variable as such as random versus nonrandom relationships.

Once the average ES has been calculated, it is important to determine what it means. Cohen (1988) provides rough guidelines for the interpretation of ES and suggests using the following: $d = .2$ (small effect), $d = .5$ (medium effect), $d = .8$ (large effect).

Criticisms of the Meta-analysis

The meta-analysis has been criticized for several reasons. Rosenthal and DiMatteo (2001) cite some shortcomings of the meta-analysis. They include bias in sample findings, garbage in and garbage out, singularity and nonindependence of effects, an overemphasis on individual effects, and combining apples and oranges.

Bias is inherent in every meta-analysis because of the criteria used to include and exclude articles and the methods that are chosen to review the literature. Bias can also occur because not every article will be found on a search. Another form of bias may include a researcher not providing enough information for ES computation.

A meta-analysis typically includes studies that vary a great deal in sampling,

methods of operationalizing independent and dependent variables and methods of measuring, statistical analysis, and data-analytic approaches. When findings are clear, it can increase the generalizability of results. However, when findings are not clear "varying theoretical and methodological approaches and an unsuccessful search for moderators can be confusing and can obscure a full understanding of the story the data are trying to tell" (Rosenthal &DiMatteo, 2001, p. 66). This results in variation in article quality and meta-analyses are sometimes criticized because good and bad studies get mixed together. This is known as the "garbage in and garbage out" issue.

Meta-analyses are also criticized for not taking into account the big picture because they systematically assess only individual effects such as differences between means or zero-order correlations between independent and dependent variables.

Another criticism is the apples and oranges argument. This involves results that are summarized from various studies that vary by a large amount in their operationalization and measurement of independent and dependent variables and that utilize extremely different types of sampling units to realize answers to questions that are similar in nature, but not identical. It is argued therefore, that "meta-analysis is analogous to taking apples and oranges and averaging such measures as their weights, sizes, flavors, and shelf lives" (Rosenthal & DiMatteo, 2001, p. 68). The results may consequently be meaningless.

Shapiro and Shapiro (1982) also note that the moderating variables of the effectiveness of treatments for specific disorders, the efficacy of an intervention, and the conclusions drawn from meta-analysis reviews cannot go beyond the limitations of the data. In other words, conclusion accuracy is directly dependent on the quality of the

research methodology of the individual studies that were included in the meta-analysis.

A meta-analysis may also make it difficult to understand data of single-subject research because information from those studies focus on behavioral changes of individual subjects therefore making the reduction of results to a single ES quite suspect. The most relevant information gained from single-subject research "arises from the examination of the continuing changes or stabilities that can be seen throughout baseline, throughout treatments, and throughout returns to baseline, not simply in the initial, average, or final levels of pre- and postintervention performance" (Salzberg, Strain, & Baer, 1987, p. 43).

There are also concerns with ES calculations. For example, effect sizes from various experimental designs such as between-group, within-group, and single-subject may not be comparable because "effect sizes from single-subject studies are inflated when compared to those of group design studies" (Swanson & Sachse-Lee, 2000, p. 118). It has also been found that effect sizes coming from single-subject design studies conducted in controlled versus field-based settings may not be comparable because of increased variability in settings such as clinics located in the community and school classroom settings (Jenson et al., 2007).

Meta-analysis of Group Designs

According to Cohen (1988), ES means "the degree to which the phenomenon is present in the population, or the degree to which the null hypothesis is false" (p. 9). Many techniques are used to calculate ES, but Cohen's *d* (or *g*) is the most common (Bliming, 1988). Cohen's *d* is calculated by subtracting the mean of the treatment group from the mean of the control group and then dividing by the pooled standard deviation of

both the treatment and control:

$$ES = \frac{M_{control} - M_{treatment}}{sd_{pooled}}$$

This formula has been found to be a biased estimator of the population *d* (Lipsey & Wilson, 2000) so it is converted into an unbiased estimator, (*g*).

Glass, McGaw, and Smith (1981) proposed another technique to calculate ES. They proposed that ES be calculated the same way as Cohen's *d*, except that the standard deviation of the control group be used as the devisor instead of pooled standard deviation:

$$ES = \frac{M_{control} - M_{treatment}}{sd_{control}}$$

Another method used to calculate effect size is the Pearson Product Moment Correlation Coefficient *r*. This is not an effect size. However, it can be used as such because it can be obtained easily from univariate statistics when means and standard deviations are not given. The Pearson Product Moment Correlation Coefficient *r* ranges from -1.00 (perfect inverse relation), to 0.00 (no effect), to +1.00 (perfect positive relation). When using *r*, a difficulty is encountered because the metric of *r* becomes nonlinear at the outermost ends of the scale. To deal with this, Mullen (1989) recommends converting *r* to Z_{FISHER}, which overcomes the skewness of the distribution of *r* at extreme values. No decision rules must be made regarding which standard deviation to use, therefore some researchers favor the use of *r* and Z_{FISHER} (Maughan, 2003).

Combination of Effect Sizes

One can determine whether the ES favors the control group or the treatment group once an ES is calculated for each individual study. The general rule is that positive ES values are associated with the effectiveness of treatment, whereas negative ES values are associated with treatment that is not effective (Wolfe, 1986).

Once an ES is calculated the meaning must be interpreted. One technique for evaluating the ESs is to create a 95 or 99% confidence interval around the mean ES to test whether it encompasses zero. One can be more confident that there is a significant effect across studies if the average ES is different from zero. Looking at the literature published in a researcher's specific field and finding a "reasonable standard for comparison against which the magnitude of experimental effects could be evaluated" is another way of interpreting ESs for group design studies (Maughan, 2003, p. 42).

Meta-analysis of Single-subject Designs

The use of single-subject research in meta-analyses has not been as prevalent in the past as has the group design study. Maughan (2003) states that many large-scale meta-analyses that have examined treatment effects have not included single-subject research data and consequently, results from these studies may not represent the treatment literature that is available due to the exclusion of single-subject research. Scruggs, Mastropieri, and Casto (1987) suggest that synthesizing single-subject research in a meta-analysis is just as important as or more important than synthesizing group-design studies.

Several advantages have been cited for the inclusion of single-subject designs in a meta-analysis. First, a great deal of information may be left unused if single-subject data

are not combined and then synthesized. This is especially true about information regarding the overall mean effect and the factors that determine the effect of a specific treatment. Second, in certain areas in which the population that is under investigation is either diverse or very small, or where random assignment of participants in a study is impractical or unethical, single-subject case designs are the only source of information (Van den Noortgate & Onghena, 2003a). Finally, group-design studies are often aggregated. This leads to less information being available about individual participants in a study than in single-case design studies (Van den Noortgate & Onghena, 2003b). Van den Noortgate and Onghena (2003a) state

> In a single-case study, one or a couple of cases are measured repeatedly over time, giving valuable information about individual cases, but making generalizations for less obvious cases. A set of single-case data that are aggregated afterwards combines the strengths of both designs by giving information not only about the overall effect but also about the effects for the individual cases. (p. 327)

There are also problems associated with using single-subject data. Two of the biggest problems that have been cited are autocorrelation and trend. Autocorrelation is defined as "a description of data that indicate the extent to which values in one subset of a series predict values of another subset" (Johnston & Pennypacker, 1993, p. 363). Autocorrelations occur "when measurements (i.e., observations) made in a time series are correlated with their own past and future values" (Jenson et al., 2007, p. 485). Autocorrelations occur because single-subject data are temporally ordered and cannot be considered independent. Observations that are not independent frequently produce nonindependent residuals. This is a violation of one of the basic assumptions of most statistical tests of significance. The second problem with single-subject data is trend, which is the tendency of observations that are repeated to fall or rise systematically over

time, independent of the actual treatment. If the effect size of a treatment is not calculated properly and trend is not accounted for, effect sizes might be under or overestimated, which may result in an increased likelihood of a Type I error (West & Hepworth, 1991).

Analysis of Single-subject Designs

Several methods have been used to analyze single-subject data in the past. These include percentage of zero data (PZD), d-trending (Campbell, 2004), percentage of nonoverlapping data (PND), Busk and Serlin, ITSACORR, and hierarchical linear modeling (Jenson et al., 2007).

Percentage of zero data (PZD). The percentage of zero data (PZD) summarizes single-subject data by calculating the percentage of treatment data points which do not overlap with the lowest or the highest baseline data points. PZD is calculated by "(a) determining the first data point in an intervention phase to reach zero, and (b) then computing the percentage of data points, from the first zero point onwards, remaining at zero in that phase" (Scotti, Evans, Meyer, & Walker, 1991, p. 238). The PZD score has been looked at as a more stringent efficacy indicator not by representing behavior reduction, but by behavior suppression.

Regression based d-Statistics (d-trending). Regression models summarize single-subject data by using linear-estimation techniques to model repeated observations (Campbell, 2004). A linear-regression model was proposed by Allison and Groman (1993) and by Faith, Allison, and Gorman (1996) where trend is removed from repeated observations by calculating predicted values based solely on baseline data. Campbell (2004) states

> Predicted values are subtracted from observed data and saved as "detrended" data. Zero-order correlations are calculated between (a) treatment phase and detrended data and (b) treatment phase by time interaction and detrended data. If the zero-order correlations share the same sign, the detrended data is regressed on treatment and on treatment by time interaction. The resulting R^2 value is converted to *d* via a standard formula. (pp. 235-236)

Percentage of nonoverlapping data (PND). Percentage of nonoverlapping data (PND) is another approach utilized in conducting a meta-analysis of single-subject research. Scruggs et al. (1987) introduced the technique which is the "proportion of overlapping data displayed between treatment and baseline" (p. 27). In the majority of cases PND can be easily computed and provides a good measure of treatment effectiveness. This measure of effectiveness represents the percentage of data points in the treatment condition that exceeds the highest or lowest point of the distribution in the baseline condition. The number of data points in the treatment that exceed the lowest or highest point in the baseline are tallied and then divided by the total number of points in the treatment phase.

Although PND may be one approach to analyzing single-subject designs in a meta-analysis, there are issues accompanying the approach. PND has the potential to be too sensitive to atypical data, is not powerful enough to discriminate important treatment differences, and is negatively affected by subtle data trends (White, 1987). It has also been noted that PND is a rather conservative measure of treatment effectiveness (Scotti et al., 1991).

Busk and Serlin: The assumption model. In 1992 Busk and Serlin introduced a nonregression statistical method. Their model yields three ways to calculate effect sizes for single-subject data designs. These designs differ in their assumptions regarding normality, equality of variance, and the intercorrelations between baseline and

intervention phases. "Model 1 makes no assumptions concerning population distributional form or equality of intermeasure variances and covariance. Model 2 assumes equality of variance across baseline and treatment phases. Model 3 makes the strongest assumptions; it assumes normal distributions and equality of variances and intercorrelations across baseline and treatment phases" (Jenson et al., 2007, p. 486). Different estimates of within-phase variability are provided so the effect sizes for the three models differ. Also, autocorrelations and trends "produce heterogeneity of variance and covariance and affect the tenability of the assumptions that underlie the three Busk and Serlin models" (Jenson et al., 2007, p. 486). When the purpose of the meta-analysis is descriptive, then Model 1 or Model 2 is suggested for use for single-subject designs. If the purpose of the study is to test a specific hypothesis and produce a generalizable estimate of treatment outcome then Model 3 is suggested (Busk & Serlin, 1992).

ITSACORR. Interrupted Time-Series Analysis for Autocorrelated Data (ITSACORR) is a computer program that was developed to make use of interrupted time-series analysis to provide acceptable power and control Type I error. All data are entered into a computer and ITSACORR performs the entire analysis. It reports whether there has been a change in slope or intercept and then graphs the data with estimated steady-state trend lines. As few as five scores per phase of the single-subject data are acceptable to maintain an acceptable level of Type I and Type II error. More accurate estimations of data can be obtained if 10 to 20 scores per phase are used (Crosbie, 1993).

ITSACORR computes three statistics. First, ITSACORR yields an overall *F* statistic (Stage & Quiroz, 1997). If the *F* statistic is significant, it reveals change between the baseline and treatment phases (Maughan, 2003). Second, ITSACORR produces a *t*

statistic that describes the change in the slope between baseline and treatment (Stage & Quiroz, 1997). Kazdin (1982) states that a change in intercept, or level, refers to change in behavior at the point the intervention was put in place. Finally, ITSACORR tests the change in y-intercept between the regression line of the baseline and treatment phases. The number of data points for the baseline and treatment phases can then be used in conjunction with this y-intercept *t* statistic to calculate an ES. Effect size is calculated by taking individual data points from the baseline and treatment phases and entering them into ITSACORR (Stage & Quiroz, 1997). If the results are significant it would imply that means changed across phases and that trends were changing at various rates over time. It may also mean that learning or maturation is taking place (Maughan, 2003). Finally, a change in level without a change in slope implies a change in mean performance (Kazdin, 1982).

Recent research has found that the ITSACORR method is unreliable and inconsistent even though it was once thought to be a reliable way to calculate effect sizes for single-subject designs while controlling for autocorrelation. Therefore, researchers doing a meta-analysis have been advised against using it (Huitema, McKean, & Laraway, 2005). It has also been found that ITSACORR yields conservative estimates of the effectiveness of interventions (Jenson et al., 2007).

Hierarchical Linear Modeling. Hierarchal Linear Model (HLM) also provides estimates of the effects of treatments reported by different investigators that can be transformed into a common metric. In general, HLM allows for the (a) estimation of the average effect size across a set of studies, (b) the estimation of variance of the ES parameters, and (c) the ability to pose and test a series of linear models to explain

variation in the ES parameters (Bryk & Raudenbush, 1992).

Van den Noortgate and Onghena (2003a) state that HLM is a natural model to use to pool data when analyzing single-subject research. HLM models are typically used when data are hierarchically structured, meaning that scores come from units (e.g., pupils), that belong to different subgroups (e.g., classes), which can be categorized in groups (e.g., schools). According to Van den Noortgate and Onghena (2003a):

> By modeling the hierarchical structure, the possible dependence of the scores is taken into account (e.g., scores of pupils from the same class are likely to be more similar because of selection or because these pupils are influenced by common factors and by each other. (p. 329)

Hierarchal Linear Model (HLM) provides estimates of the effects of treatments reported by different investigators that can be transformed into a common metric. Data can be analyzed in regard to moderator variables such as age, level of the participant's cognitive functioning, and treatment setting, all of which could have an effect on treatment outcome. Bryk, Raudenbush, and Congdon (2002) explain that consistency of results is important when conducting a meta-analysis. When results vary across studies, investigators may ask why. A difficulty that may occur when determining why individual scores may differ in their results is that while each study may estimate a "true" effect, sampling error will vary from study to study. If significant variance among studies is discovered, a model may be devised to account for it. In general, HLM allows for the estimation of the average effect size across a set of studies, the estimation of variance of the effect size parameters, and the ability to pose and test a series of linear models to explain variation in the effect size parameters.

Hierarchical linear models use two, and sometimes three levels of interpretation. At level 1, a regression equation is created for each participant in the meta-analysis to

determine if a difference exists between the baseline and treatment phases. According to Van den Noortgate and Onghena (2003a) the following regression equation can be used at the first level:

$$Y_{iij} + \beta_{0j} + \beta_{1j}\,(\text{condition})_{ij} + e_{ij}$$

with Y_{iij} the response score of case j for occasion i, $(\text{condition})_{ij,}$ an indicator that equals 1 of occasion i for case j and is part of the intervention condition, 0 otherwise, and e_{ij} a random error term. The expected responses for case j in the baseline phase and the intervention phase can be interpreted as β_{0j} and $(\beta_{0j} + \beta_{1j})$, respectively. β_{1j} can be interpreted as the level of the performance or effect of a certain intervention on case j.

Another regression equation is developed at level 2 to determine which moderator variables account for the variance among participants in effects of treatment and if there is a significant treatment effect according to the level 1 analysis. A significant treatment effect at level 1 means there was a significant change in behavior between the baseline and treatment conditions. Moderator variables include participant characteristics such as gender, age, diagnosis, and cognitive ability. Other variables may include the specific type of treatment, the treatment setting, or who implements the treatment. It is important to analyze these moderator variables in single-subject research because specific intervention effects or the base level of performance depend on the characteristics of the individual or the specific treatments. Due to this fact, the second regression equation could be as follows:

$$\beta_{0j} = \gamma_{00} + u_{0j} \text{ and } \beta_{1j} = \gamma_{10} + u_{1j},$$

in which γ_{00} and γ_{10} are the mean base level and the average effect of treatment, respectively, and u_0 and u_{1j}, as the random increments of base level and effect, characteristic of case j (Van den Noortgate & Onghena, 2003a).

No elevation of Type-1 error levels for autocorrelated single-subject data were revealed when investigators used Monte Carlo simulations using HLM 5.05. Hypothetical data were varied on several levels, including the number of subjects, number of data points per subject and the level of autocorrelation, ranging from .00 to .80. Results of these investigations indicate that α–levels were not inflated, thus negating the increased likelihood of Type 1 error rate (personal communication John Kircher, July 2004).

The parameters of hierarchical linear models can be estimated by employing sophisticated computer software programs, such as MLwiN and HLM or by using statistical packages, such as SAS or S-Plus (Van den Noortgate & Onghena, 2003a).

Examining and Reducing Bias

There are a variety of ways in which literature reviews can lead to biased or erroneous conclusions. There are a variety of ways to approach this problem, one of which is testing for homogeneity. For example, if a series of studies provides a common estimate of the population ES, it is said to be homogeneous. When a group of ESs are homogeneous, the dispersion of ESs around their mean is no greater than that expected from sampling error alone (Lipsey & Wilson, 2000). When studies are homogeneous, it is more likely that the various studies are testing the same hypothesis (Wolfe, 1986). If the ES distribution is not homogeneous, then the observed ES does not estimate a common population mean (differences other than subject-level sampling error exist), and

the distribution is considered to be heterogeneous. If the estimates are heterogeneous, then it may be unclear whether each study is testing the same hypothesis. Examining the homogeneity/heterogeneity of a group of studies to be combined in a meta-analysis enables the reviewer to determine the extent to which the combined level of significance and/or the mean magnitude of effect accurately characterize the results of the research domain as a whole (Mullen, 1989).

Homogeneity tests are conducted using a *Q* statistic, which is distributed as a chi-square statistic with k-1 degrees of freedom. If *Q* is greater than the critical value for chi-square with k-1 degrees of freedom, then the null hypothesis of homogeneity is rejected. Therefore, a significant *Q* indicates that the distribution is heterogeneous. Calculating a homogeneity test such as the one described above assumes a fixed effects model. The ES, under a fixed effects model, is assumed to estimate the population effect with random error, which results only from chance factors associated with subject level sampling error in the study. If the assumptions of a fixed effects model are rejected, the researcher may choose to continue to assume a fixed effect model, assume a random effects model, or assume a mixed effects model (Hedges & Olkin, 1985).

Researchers have supposed for quite a while that studies published in the social and behavioral sciences are a biased account of the research that is actually being conducted (Maughan, 2003). The extreme view of this problem has been described as the "file drawer problem." This difficulty states that approximately 5% of studies published in journals are Type I errors (i.e., rejecting the null hypothesis when it is true), while 95% of the studies that are not published have nonsignificant results (i.e., $p>.05$) (Rosenthal, 1991). Cooper (1979) suggested one way to deal with this problem. He recommended

calculating a number called a Fail Safe *N* (N_{FS}), which is a statistic that allows the researcher to demonstrate that adding a certain number of other studies would not significantly change the combined results. Maughan (2003) stated, "The N_{FS} estimates the number of unretrieved studies averaging null results, or no effect, which would be needed to bring the overall probability obtained from the combined significance test to a value higher than the critical value for statistical significance, usually .05 or .01" (p.45).

Purpose of the Study

The purpose of the study was to determine the effectiveness of various forms of interventions designed to reduce and prevent noncompliance in children and young adults. Phase I of the study examined the nature of the designs of the study to determine if there were sufficient data to answer the research questions. Phase II of the study reviewed and synthesized the results of previous research regarding the treatment and prevention of noncompliance by conducting a comprehensive search of previously published research and by conducting a quantitative analysis of the intervention by way of a meta-analysis.

Research Questions

1. To what extent do the obtained effect sizes from HLM differ on the effectiveness of individual treatments for noncompliance depending on the type of noncompliant behavior (direct defiance, passive noncompliance, simple refusal, negotiation, whining, slowness to respond etc.)?
2. What is the global effect size (within each of the design categories) for all the interventions reviewed in each of the design study categories (single-subject

designs, mixed and between-subjects designs, within-subjects designs) to prevent or reduce noncompliant behavior in children, adolescents, and young adults using HLM?

3. To what extent do obtained effect sizes from HLM differ on the effectiveness of individual treatments for noncompliance depending on the type of intervention used (manipulation of antecedents, manipulation of behavior, manipulation of consequences, training: parent, teacher, child)?
4. To what extent do the obtained effect sizes from HLM differ on the effectiveness of individual treatments for noncompliance depending on the variable that is manipulated (behavior momentum, errorless compliance training, nonverbal behaviors, precision request/effective instruction delivery, positive and negative reinforcement, extinction, punishment, parent training, teacher training, child training)?
5. To what extent does a child's diagnosis (ADHD, ODD, CD, etc.) affect the effect size result of intervention effectiveness of individual treatments for noncompliance when HLM is used?
6. Using HLM is the mean effect size representing the effectiveness of individual treatments by age of the participants different from zero?
7. Using HLM is the mean effect size representing the effectiveness of individual treatments by gender of the participants different from zero?
8. Using HLM is the mean effect size representing the effectiveness of individual treatments by setting (school, clinic, home, residential/institution/hospital) different from zero?

9. Using HLM is the mean effect size representing the effectiveness of individual treatments based on who implemented the treatment (teacher, clinician, parent, assistant) different from zero?
10. To what extent do the obtained effect sizes from HLM differ on the effectiveness of individual treatments depending on whether a functional behavior assessment or functional analysis was performed?
11. Using HLM is the mean effect size representing the effectiveness of individual treatments by type of study (journal article, book chapters etc. vs. thesis/dissertation) different from zero?
12. How many new, filed, or unretrieved studies averaging no effect would be needed to bring the overall combined magnitude of effect to “small”?

CHAPTER II

METHOD

Literature Search Procedures

Academic Search Elite, Biomedical Reference Collection: Basic, ERIC, Health Source: Nursing/Academic Edition, Medline, Professional Development Collection, *Psych*ARTICLES, Psychology and Behavioral Sciences Collection, *Psych*INFO, and *Digital Dissertations* are computer databases that were searched to find potential studies for the meta-analysis. Other potential studies were located through review articles and the reference lists of relevant articles, chapters, and books. Hand searches through the following relevant journals were also conducted: *Behavioral Disorders, Behavior Modification, Behavior Therapy, Child Development, Developmental Psychology, Education and Treatment of Children, Journal of Abnormal Child Psychology, Journal of Applied Behavior Analysis, Journal of Behavior Education, Journal of Child Psychology and Psychiatry, Journal of Clinical Child Psychology, Journal of Emotional and Behavior Disorders, Journal of School Counseling, Journal of School Psychology, Journal of Special Education, Journal of the American Academy of Child and Adolescent Psychiatry, Psychology in the Schools, School Psychology International, School Psychology Quarterly,* and *School Psychology Review.*

The following descriptive terms were used to conduct article searches: noncompliance, noncompliant, compliance, compliant, compliance training, toddler

compliance, toddler noncompliance, child compliance, child noncompliance, young-adult compliance, young-adult noncompliance, adolescent compliance, adolescent noncompliance, strong-willed, attention deficit hyperactivity disorder, ADHD, oppositional defiant disorder, ODD, conduct disorder, CD, aggression, externalizing behavior, behavior problems, behavior disorders, severe emotional disturbance, juvenile court, juvenile delinquency, assertiveness replacement, errorless compliance, rule-breaking, reactive attachment disorder, manipulation of behavior, parent training, disruptive behavior, child disobedience, refusal, resistance, oppositional, behavioral momentum, interspersed requests, high-probability requests/sequences, low-probability requests/sequences, antecedents to increase compliance, antecedent to compliant behavior, consequence(s) for noncompliance, prompting procedures, precision commands, maladaptive, treatment, and intervention. All abstracts were examined prior to study selection to eliminate studies that did not clearly meet the inclusion criteria.

Criteria for Study Inclusion

Identified studies needed to meet the following criteria to be included in the meta-analysis:

1. Studies must have been published between the years of 1965 and 2009.
2. Studies had to be published in English.
3. Participants had to be between the ages of 24 months and 22 years, 11 months.
4. Studies had to be theses, dissertations, or published journal articles.
5. The target behavior had to include at least one example of noncompliance or a method to increase compliance.

6. Sufficient quantitative information had to be reported in the study to permit calculation or estimation of an appropriate effect size statistic.
7. Each study had to use one of the following research designs:
    a. A mixed and between-subjects group design, defined as an experimental design in which a no-intervention control group and one or more active treatment groups are employed or a combination of designs.
    b. A within-subjects group design, defined as an experimental design in which subjects serve in all or in a particular subset of the treatment conditions with repeated measurements taken on at least two occasions.
    c. A single-subject design, defined as an experimental design in which changes in behavior are documented for an individual participant and allow for the demonstration of functional relationships between the intervention and behavioral change.
8. Single-subject design studies had to provide a graph displaying raw data demonstrating changes in behavior of an individual participant. Each graph must include baseline data as well as treatment data, as both types of data are necessary for computation of the effect size. If a study reports more than one participant, each participant will be treated as a separate study.
9. Each single-subject design study had to include at least 3 data points in each phase of the intervention. In multiple probe studies, a minimum of 3 probes had to be reported for each phase. In cases where there were insufficient data points for some subjects in a study, the subjects with sufficient data points in the study were used.

10. Each single-subject study had to use one of the following research designs (as defined by Kazdin, 1982):

(1) *$A_1B_1A_2$ Design*: This type of design collects baseline data on a participant until the data stabilizes, after which an intervention is implemented and data are collected until stability is obtained once again. Finally, the intervention is withdrawn and the baseline phase is restored.

(2) *$A_1B_1A_2B_2$ Design*: This design adds an additional treatment phase to the $A_1B_1A_2$ design.

(3) *Multiple Baseline Across Behaviors Designs*: This design tracks at least three independent behaviors. Data are gathered under the same condition on each behavior until stable baselines are obtained. An intervention is then applied to the first behavior. Meanwhile, data continue to be gathered for each behavior. Once the first behavior reaches the criterion level and the other behaviors that remain have stabilized, the intervention is started for the second behavior. The first and second behaviors are receiving the intervention at this point, and data continue to be collected for each behavior. The process continues until the intervention has been applied to all behaviors.

(4) *Multiple Baseline Across Settings Designs*: This design tracks one behavior across a minimum of three settings. Once stable baselines are obtained in each of the settings, the intervention is introduced in one setting. Meanwhile, baseline conditions are continued for the others. After the criterion level is reached in the first setting and the behavior stabilizes in the remaining settings, the intervention is applied to the behavior in the second

setting. This procedure is repeated until the intervention is begun in all of the settings.

(5) *Multiple Baseline Across Participants Designs*: This design monitors the same behavior under the same conditions for at least three subjects until stable baselines are obtained. The intervention is initiated with one of the participants. Meanwhile, baseline conditions are continued for the other participants. Once the first participant's target behavior reaches the criterion level and the behaviors stabilize for all participants, the treatment is introduced to another participant. This process is repeated until all subjects receive the intervention.

(6) *Multiple Probe Designs*: This design type is similar to multiple baseline designs, but differs in the amount of data collected at baseline and occasionally during treatment. Rather than collecting data continuously, assessment probes are conducted on occasion.

(7) *Multitreatment Designs (e.g., $A_1B_1A_2C_1A_3D_1$,)*: This type of design initiates a baseline phase until data on the target behavior are stabilized. The first treatment is then applied until the target behavior stabilizes. Once the target behavior is stabilized, the baseline phase is restored until stable data are obtained. Then, a second intervention is implemented. Once the target behavior stabilizes in this phase, a third baseline phase, or a return to the first intervention phase is started. If a third intervention is applied, the next phase may consist of a return to baseline, the first intervention, or the second intervention. In order to be included in this meta-analysis, multitreatment

designs had to allow for a direct comparison of an intervention with a baseline phase.

11. Each mixed or between group design study had to include a pre and post test score and a pre and post standard deviation score for the control group and the treatment group.

Table 5 includes further information about the primary reasons that articles were excluded from the analysis.

Method for Analyzing Research Articles

Specific features of the study articles included in the meta-analysis were coded based on specific article characteristics (See Appendix A for the coding sheet). Study information that was coded includes: source of the study (i.e., journal, thesis, dissertation), research design (i.e., group design, single-subject), whether a functional analysis or a functional behavior assessment was performed prior to treatment implementation, age of participant, gender of participant, whether there is a diagnosis (e.g., ADHD, ODD, CD, other), setting (i.e., school, clinic, home, residential/institution, unknown), implementer of the treatment (e.g., clinician, teacher, parent, assistant), type of noncompliant behavior (i.e., direct defiance, passive noncompliance, simple refusal, negotiation, whining, slowness to respond, unknown/other), type of intervention(s) used (i.e., manipulation of antecedents, manipulation of behavior, manipulation of consequences, parent, teacher, or child training), and type of treatment (i.e., behavior momentum, errorless compliance training, positive and/or negative reinforcement, extinction, parent training, etc.). A separate form was also be developed for recording individual data points from each

Table 5. Article Exclusion

Reasons for Article Exclusion
Article did not give an example of noncompliance
Articles did not give an example of a way to increase compliance
Participants were younger than 24 months or older than 22 years 11 months
Single-subject articles did not include at least 3 baseline data points
Single-subject articles did not include at least 3 treatment data points
Single-subject articles did not include a graph displaying raw data points
Single-subject articles did not include baseline data
Group design articles did not include pre and/or post test data
Group design articles did not include standard deviation data
Article only used medication as an intervention
Article used medication in conjunction with other intervention(s)
Article only measured how well parent/teacher implemented treatment
Article measured compliance to medical procedures
Article was published before 1965

single-subject design study (See Appendix B).

Reliability of Data Collection

Thirty percent of randomly selected studies were coded by an independent rater using the same coding procedure as the author. Agreement rate (AR), also called the percentage of interrater agreement, was found by dividing the number of agreements by the number of disagreements per case. Interrater reliability of single-subject graphs will be calculated in a similar manner. Reading graphed data in many single-subject design studies is difficult. Therefore, reliability checks on each data point were performed and considered to be in agreement if the raters coded the data within +/- 1 point of each other. The number of agreements was also divided by the number of disagreements plus agreements per case to find the percentage of agreement.

Computation of Effect Sizes

Statistics used in meta-analyses are often constrained due to research findings and statistics of different sorts. In order to overcome this difficulty, Lipsey and Wilson (2000) suggest analyzing each experimental finding separately. The present meta-analysis examined studies utilizing mixed and between-subject group designs, within-subject group designs, and single-subject group designs. There were to be three separate global ES statistics, not one composite ES.

Single-subject Designs

The format was rearranged for single-subject design studies using $A_1B_1A_2$ design or $A_1B_1A_2B_2$ design into either $A_1A_2B_2$ or $A_1A_2B_1B_2$ format so that the data were represented as one baseline condition and one treatment condition. For studies that used a multiple

baseline design across settings, each setting was treated as a separate AB design. For studies using multiple baseline designs across participants, each participant was treated as a separate AB design.

Mixed and Between-subject Designs

Between-subjects design comparisons between treatment and control groups were expressed as an unweighted measure of ES, represented by *g*. The following formula was used to find *g* from the means and standard deviations provided in the between-subjects design:

$$g = \frac{(M_E - M_C)}{S_{pooled}}$$

where M_E is the mean of the control or experimental group, M_C is the mean of the control group, and S_{pooled} is the standard deviation. S_{pooled}, which represents the square root of a pooling of the variances of the experimental and control groups (Johnson, 1989), was calculated with the following formula:

$$S_{pooled} = \text{SQRT } \{[(n_E-1)(S_E)^2 + (n_C-1)(s_C)^2] / [n_E + n_C - 2]\}$$

where n_E represents the number of observations in the experimental groups and n_C represents the number of observations in the control group. Hedges and Olkin (1985) stated that when sample sizes are less than 20, ES has a tendency to be upwardly biased. After *g* is calculated this bias can be removed to reveal the unbiased ES *d* by using the following formula:

$$d = [1 - (3/4N-9)]g$$

where N is the total sample size and represents n_e+n_c. When sample size is large, the *d* and *g* statistics are essentially the same (Hedges & Olkin, 1985). All ES estimates were corrected using this formula.

Standard error (SE) was also considered when calculating ES estimates. The smaller the standard error term, the larger the weight it was given because it tends to correspond to more precise ES values. Each ES in the present analysis was weighted by the inverse variance using the following:

$$w = 1/SE^2$$

and SE is calculated using the following:

$$SE = SQRT\ (n_1+n_2)/(\ n_1n_2) + d^2 / 2(n_1+n_2 - 2)$$

where n_1 is the treatment group sample size and n_2 is the control group sample size.

Within-subject Designs

Unweighted ES estimates were calculated for within-subjects designs using the same formulas for between-group designs with one exception; $s_{d,}$, the standard deviation of the differences between paired observations will replace S_{pooled} using:

$$S^2_d = s_E^2 = s_C^2 - 2r_{SESC}$$

where s_E^2 is the variance of the experimental treatment, s_C^2 is the variance of the control treatment, and r_{SESC} is the correlation between experimental and control scores (Johnson, 1989). An ES of zero was used for studies that did not include a control group and the

formula proposed by Hedges and Olkin (1985) will again be used to calculate *d* as an unbiased estimator of ES.

Computation of Effect Sizes with Hierarchical Linear Model

Hierarchical Linear Model (HLM) provides estimates of the effects of treatments reported by different investigators that can be transformed into a common metric. Bryk, Raudenbush, and Congdon (2002) explain that consistency of results is important when conducting a meta-analysis. When results vary across studies, investigators may ask why. A difficulty may occur when determining why individual scores may differ in their results is that while each study may estimate a "true" effect, sampling error will vary from study to study. If significant variance among studies is discovered, a model may be devised to account for it. In general, HLM allows for the estimation of the average effect size across a set of studies, the estimation of variance of the effect size parameters, and the ability to pose and test a series of linear models to explain variation in the effect size parameters. The hierarchical model consisted of two levels in the present study. At level-1, a regression equation was created for each participant in the meta-analysis to determine if a difference existed between the baseline and treatment phases. A level-2 regression equation was then developed to determine what, if any, moderator variables accounted for the variance among participants in effects of treatment (Bryk & Raudenbush, 1992).

HLM allows for the analysis of models with two or three levels of nesting. All models can be formulated using an SPSS data worksheet. First, individual data points from each graph were transformed into *z*-scores. Next, two fixed ASCII (.dat) files were created to serve as input to the HLM 6 program (Bryk, Raudenbush, & Congdon, 2002).

One file contained the individual data points for each participant. The data in that file provide the information needed to estimate the effect size for each participant. The other file was used by the HLM program to test if participant characteristics moderated the effect of treatments. The following Level-1 null model was used to conduct a random effects analysis of the variance (ANOVA):

$$Y_{ij} = \beta_j(X_{ij}) + r_{ij}$$

where Y_{ij} is the individual *z*-score for occasion *I*, participant *j*, βj is the difference between baseline and treatment phases (e.g., the ES for participant *j*), X_{ij} is a dichotomous variable to distinguish baseline and treatment phases, and r_{ij} is a residual. This model represents a regression equation for each participant and the difference between the baseline and treatment phases is indicated by βj.

The level-2 model includes:

$$B_j = \gamma_0 + \upsilon_{1j}$$

where γ_0 is the grand mean ES, υ_{1j} is the difference between the ES for participant *j* and the grand mean ES (γ_0). Characteristics of participants, types of treatments, etc., may be added to the Level-2 model to explain why treatment effects may be found with some participants and not others.

Prior to including moderator variables to the Level-2 model, a χ^2 will be performed to determine if the variance in obtained ES scores across participants can be attributed to chance. It the χ^2 is found to be significant, moderator variables will be added to the Level-2 model to account for the variance among participants.

Effect Size Composites

A composite effect size was computed for each of the three designs (mixed and between, within, and single-subject). Composite effect sizes from the mixed and between-group and within-group design studies were calculated by averaging the weighted *d* values. The effect size was averaged across studies to compute a composite effect size using the following formula where *d* is the size will be averaged across studies to compute a composite effect size using the following formula where *d* is the effect size for each independent study and w is the weight:

$$d_{average} = \frac{\sum (wd)}{\sum w}$$

For single-subject research designs, the effect sizes derived from HLM were compared in accordance with the guidelines offered by Cohen (1988) to determine if there was a significant difference between the two metrics.

Examining and Reducing Bias

File Drawer Problem

A fail-safe *N* (N_{fs}) for ES *d* was computed to determine the number of null findings (e.g., ES=0) that would be necessary to reduce a significant effect size to a nonsignificant effect size. This was computed using the following formula described by Orwin (1983):

$$N_{fs} = N(d_{average}-d_c)/d_c$$

where *N* is the number of studies in the meta-analysis, $d_{average}$ is the average effect size for

the studies in the meta-analysis, and d_c represents the criterion value selected that *d* would equal when some potentially knowable number of hypothetical studies (N_{fs}) were added to the meta-analysis (Orwin, 1983). The N_{fs} yields the number of new, filed, or unretrieved studies averaging null results, or no effect, that would be needed to bring the overall combined magnitude of effect to some negligible level.

Analysis of Homogeneity

After computing a composite ES, the homogeneity of the *d*s will be examined in order to determine whether the collection of studies could be adequately described with a single ES. A homogeneity statistic, Q, which is distributed as a chi-square statistic with k-1 degrees of freedom where k is the number of ESs, will be calculated as follows:

$$Q = \sum (wd^2) - \frac{[\Sigma (wd)]^2}{\sum w}$$

The homogeneity statistic will be calculated to determine whether the values of *d* used to calculate a mean ES were consistent within a set. Homogeneity is indicated when the Q statistic has a large, statistically significant value, suggesting that one or more features that are present in some studies and absent in others are affecting the magnitude of the ESs (Hedges & Olkin, 1985). The relationship between these moderator variables and the ES estimates were further investigated using HLM.

CHAPTER III

RESULTS

The purpose of the present study was to conduct a meta-analysis to determine the effectiveness of interventions used to reduce noncompliant behavior in children, adolescents, and young adults.

Phase I

Characteristics of the Studies

More than 30,000 abstracts were identified during the initial literature search. All abstracts found were read to determine if they fit the criteria for the study. Abstracts that obviously did not meet the inclusion criteria were immediately discarded. The articles immediately discarded typically included a medication component, instances in which the subjects were too old or too young, or those that did not include a direct example of noncompliance. Nearly 7,000 articles were viewed online beyond the abstract to further determine which ones met the study inclusion criteria. One thousand two hundred studies were collected for further examination to determine if they fit the criteria for inclusion. A total of 258 articles were included in the study. One hundred seventy-nine single-subject articles, compromising 15% of the total number of articles collected, were used in the study. Seventy-nine mixed and between group design studies, comprising 6% of the total number of articles collected, were used in the study. Articles discarded typically did not

meet the inclusion criteria because their definition of the dependent variable did not give a direct example of a decrease in noncompliance or an increase in compliant behavior. Single-subject studies were further eliminated because there were not enough data points in the baseline or treatment phases. Group design studies were typically eliminated because standard deviation for pre- and/or posttest data was not reported.

The total number of participants included in the study was 6,249. The total number of subjects in the single-subject component of the study was 459 with a total of 12,728 data points. All 459 subjects were included in the HLM analysis. The total number of subjects in the group design component of this study was 5,790, with 2,606 being part of the control group and 3,184 being part of the treatment group. Pretest and posttest data with their respective standard deviations were included as part of the analysis in each of the group design studies. Table 6 includes a summary of subject characteristics.

Within-subject design studies were eliminated from the present study after examining all of the information gathered in Phase I of the study. A total of 17 within-subjects design studies were initially found. However, only three of these studies included all of the information needed to calculate an effect size. Furthermore, very few studies with this particular design type met the study inclusion criteria. Therefore, it was determined that within-subject design studies were not to be included in the meta-analysis.

Parent training was chosen as the control group when examining research questions. This was decided upon due to the amount of research that has been conducted that has shown parent training to be an effective intervention for children and

Table 6. Characteristics of the Included Studies

		N
Total Number of Studies		258
Total Number of Subjects		6,249
	Single-subject	459
	Group Design	5,790
	Control Group	2,606
	Treatment Group	3,184
Diagnosis (Single-subject Design by Subject)		
	ADHD	58
	ODD	27
	CD	8
	Adjustment Disorder with Disorder of Conduct	1
	Autism	64
	Mental Retardation	109
	Mood Disorder	6
	Traumatic Brain Injury	4
	Enuresis	9
	Encopresis	0
Diagnosis (Group Design by Subject; Treatment Group Only)		
	ADHD	40
	ODD	32
	CD	30
	Adjustment Disorder with Disorder of Conduct	1
	Autism	4
	Mental Retardation	4
	Mood Disorder	2
	Traumatic Brain Injury	1
	Enuresis	2
	Encopresis	3
Noncompliant Behavior Type (Single-subject Design by Subject)		
	Direct Defiance	174
	Passive Noncompliance	92
	Simple Refusal	8
	Negotiation	1
	Slowness to Respond	44
	Whining	9
	Other/Not Specified	131
Noncompliant Behavior Type (Group Design by Subject; Treatment Group Only		
	Direct Defiance	25
	Passive Noncompliance	0
	Simple Refusal	2

Table 6. Continued

		N
	Negotiation	0
	Slowness to Respond	1
	Whining	0
	Other/Not Specified	51
Intervention Type (Single-subject Design by Study)		
	Antecedent Manipulation	72
	Consequence Manipulation	92
	Training (Parent, Teacher, Child)	77
Intervention Type (Group Design by Study; Treatment Group Only)		
	Antecedent Manipulation	0
	Consequence Manipulation	17
	Training (Parent, Teacher, Child)	70
Treatment Type (Single-subject Design by Study)		
	Behavior Momentum	29
	Errorless Compliance Training	14
	Nonverbal Behaviors	5
	Precision Request/Effective Instruction Delivery	25
	Positive and Negative Reinforcement	70
	Extinction	2
	Punishment	27
	Parent Training	31
	Teacher Training	11
	Child Training	35
Treatment Type (Group Design by Study; Treatment Group Only)		
	Behavior Momentum	0
	Errorless Compliance Training	0
	Nonverbal Behaviors	0
	Precision Request/Effective Instruction Delivery	0
	Positive and Negative Reinforcement	13
	Extinction	1
	Punishment	7
	Parent Training	63
	Teacher Training	5
	Child Training	2
FBA/Functional Analysis (Single-subject Design by Subject)		
	Yes	80
	FBA/FA	30/50
	No	379
FBA/Functional Analysis (Group Design by Subject; Treatment Group Only)		
	Yes	1

Table 6. Continued

		N
	FBA/FA	0/1
	No	78
Age (Single-subject Design by Subject)		
	Mean Age in Years	7.0
	Age Range of Participants	2.0-22.0
Age (Group Design by Subject)		
	Mean Age in Years	6.2
	Age Range of Participants	2.0-13.83
Gender (Single-subject Design by Subject)		
	Male	312
	Female	114
	Unknown	33
Setting (Single-subject Design by Study; Some Studies had Multiple Sites)		
	School	63
	Home	67
	Clinic	34
	Residential/Institution/Hospital	20
Setting (Group Design by Study; Treatment Group Only)		
	School	9
	Home	17
	Clinic	47
	Residential/Institution/Hospital	1
	Unknown	5
Implementer (Single-subject Design by Study;)		
	Professor/Clinician	59
	Assistant	23
	Parent	58
	Teacher	44
Implementer (Group by Study Design; Treatment Group Only)		
	Professor/Clinician	49
	Assistant	6
	Parent	15
	Teacher	2
	Unknown	7
Type of Study (Single-subject Design by Study)		
	Journal Article	150
	Dissertation/Theses	29
Type of Study (Group Design by Study)		
	Journal Article	68
	Dissertation/Theses	11

adolescents. For example, Maughan (2004) conducted a meta-analysis concerning the effectiveness of behavioral parent training for parents of children with externalizing behaviors and disruptive behavior disorders. The result of the meta-analysis showed that overall behavioral parent training was an effective intervention for children and adolescents with externalizing and disruptive behavior disorders. Webster-Stratton (1998) has also demonstrated that parent training is an effective intervention for preschool aged children. There are numerous other examples of research studies that demonstrate the effectiveness of parent training. Therefore, parent training was chosen as the control group in the current study.

Phase II

The first goal in Phase II of the study was to determine if the interventions used in the various studies were effective in reducing noncompliant behavior. The second goal was to determine whether specific moderator variables (diagnosis, intervention type, noncompliant behavior type, treatment type, whether a functional behavior assessment or functional analysis was conducted, age, gender, setting, treatment implementer, and article source) accounted for effectiveness or ineffectiveness of the interventions.

Reliability

Reliability of the coded data from both single-subject and group design studies was examined. Twenty percent of single-subject articles, for a total 36 articles, and 20% of group design articles, for a total of 16 articles, were coded a second time by an independent rater and compared to the original coding sheet. The percentage of agreement between the two raters on the coding of data points and moderator variables

can be found in Table 7.

Examination of Research Questions

All of the study questions were examined using HLM. A summary of the HLM results for single-subject studies can be found in Table 8. A summary of the HLM results for group design studies can be found in Table 9. In this study, both decreases in noncompliant behavior and increases in compliant behavior were examined.

Research Question #1: To what extent do the obtained effect sizes from HLM differ on the effectiveness of individual treatments for noncompliance depending on the type of noncompliant behavior (direct defiance, passive noncompliance, simple refusal, negotiation, whining, slowness to respond etc.)?

Single-subject Design Studies

Type of noncompliance of the subject, when compared to those subjects with no type of noncompliance reported, was not statistically significant, $p>.05$. This means that type of noncompliance which includes direct defiance, passive noncompliance, simple refusal, negotiation, slowness to respond, and whining did not influence treatment effectiveness more than could be accounted for by chance.

Group Design Studies

Type of noncompliance of the subject, when compared to those subjects with no type of noncompliance reported, was not statistically significant, $p>.05$. This means that type of noncompliance which include direct defiance, simple refusal, and slowness to respond did not influence treatment effectiveness more than could be accounted for by chance.

Table 7. Reliability of Coded Data

Coded Variable	**Agreement Rate**
Data - SS Studies	93%
Data - GD Studies	97%
Diagnosis – SS Studies	99%
Diagnosis – GD Studies	97%
Noncompliance Type – SS Studies	94%
Noncompliance Type – GD Studies	98%
Treatment Type – SS Studies	98%
Treatment Type – GD Studies	99%
FBA/FA – SS Studies	100%
FBA/FA – GD Studies	100%
Age – SS Studies	95%
Age – GD Studies	96%
Gender – SS studies	95%
Gender – GD Studies	NA
Setting – SS Studies	97%
Setting – GD Studies	96%
Implementer – SS Studies	92%
Implementer – GD Studies	96%
Article Type – SS Studies	100%
Article Type – GD Studies	100%

NA=Not Applicable

Table 8. Single-subject HLM Moderator Summary Statistics

Moderator Variable		***N***	**Mean Effect Size**	***p*-value**	**95% Confidence Interval**
Diagnosis					
	ADHD	58	3.38	0.206	2.46 - 4.30
	ODD	27	2.73	0.929	1.40 – 4.06
	CD	8	3.08	0.804	0.77 – 5.39
	Adjustment Disorder w/Disorder of Conduct	1	.83	0.316	-7.89 – 6.23
	Autism	64	3.04	0.597	2.12 – 3.96
	Mental Retardation	109	3.1	0.941	2.30 – 3.90
	Mood Disorder	6	4.82*	0.046	2.84 – 6.80
	Traumatic Brain Injury	4	3.12	0.791	0.77 – 5.47
	Enuresis	9	4.7	0.128	2.25 – 7.15
	Encopresis	0	--	--	--
Intervention Type					
	Manipulation of Antecedents	219	3.56	0.097	2.64 – 4.48
	Manipulation of Consequences	229	2.48	0.502	1.60 – 3.36
	Training: Parent, Teacher, Child	196	2.78	0.000**	2.00 – 3.56
Noncompliance Type					
	Direct Defiance	174	3.33	0.123	1.84 – 4.82
	Passive Noncompliance	92	3.16	0.248	1.45 – 4.87
	Simple Refusal	8	3.69	0.382	0.26 – 7.12
	Negotiation	1	3.33	0.737	-3.55 – 10.21
	Slowness to Respond	44	2.69	0.617	0.55 – 4.83
	Whining	9	.97	0.627	-3.79 – 5.73
	Other/Not Specified	131	2.71	0.526	0.97 – 4.45
Treatment Type					
	Behavior Momentum	72	4.33*	0.049	2.98 – 5.68
	Errorless Compliance Training	68	3.1	0.871	1.32 – 4.88
	Nonverbal Behavior	11	3.86	0.544	0.96 – 6.76
	Precision Request/Effective Instruction Delivery	68	3.24	0.696	1.83 – 4.65
	Positive and Negative Reinforcement	182	3.79	0.739	2.77 – 4.81
	Extinction	4	5.17	0.343	0.62 – 9.72
	Punishment	73	2.14	0.247	0.77 – 3.51
	Parent Training	84	2.96	0.000**	2.08 – 3.84
	Teacher Training	18	2.32	0.546	0.24 – 4.40
	Child Training	94	2.4	0.379	1.15 – 3.65
Functional Behavior Assessment/Analysis					
	Functional Behavior Assessment	30	3.57	0.346	1.86 – 5.28
	Functional Analysis	50	3.92	0.110	2.49 – 5.35

Table 8. Continued

Moderator Variable		*N*	Mean Effect Size	*p*-value	95% Confidence Interval
Setting					
	School	149	3.65	0.180	2.53 – 4.77
	Home	173	2.89	0.000**	2.11 – 3.67
	Clinic	89	2.43	0.482	1.14 – 3.72
	Residential/Institution/Hospital	48	1.99	0.263	0.42 – 3.56
Implementer					
	Professor/Clinician	131	2.46	0.740	1.30 – 3.62
	Assistant	51	2.47	0.808	1.02 – 3.92
	Parent	164	2.65	0.000**	1.83 – 3.47
	Teacher	113	4.35*	0.009	3.10 – 5.60
Article Type					
	Journal Article	150	2.95	0.000**	2.44 – 3.46
	Dissertation/Thesis	29	2.97	0.977	1.75 – 4.19

*Clinically Significant

**Used as Control Group

--Not Included in Analysis (Data not Available)

Table 9. Group HLM Moderator Summary Statistics

Moderator Variable		*N*	Mean Effect Size	*p*-value	95% Confidence Interval
Diagnosis					
	ADHD	39	2.13	0.444	0.76 – 3.50
	ODD	32	1.1	0.545	-0.49 – 2.69
	CD	30	0.93	0.394	-0.58 – 2.44
	Adjustment Disorder w/Disorder of Conduct	1	8.32*	0.012	3.22 – 13.42
	Autism	4	0.62	0.559	-2.63 – 3.87
	Mental Retardation	4	1.85	0.865	-1.15 – 4.85
	Mood Disorder	2	2.19	0.775	-1.93 – 6.31
	Traumatic Brain Injury	1	-.23	0.484	-5.29 – 4.83
	Enuresis	2	3.97	0.461	-2.32 – 10.26
	Encopresis	2	.89	0.794	-4.30 – 6.08
Intervention Type					
	Manipulation of Antecedents	0	--	--	--
	Manipulation of Consequences	17	2.2	0.149	1.06 – 3.34
	Training: Parent, Teacher, Child	70	1.36	0.000**	0.71 – 2.01
Noncompliance Type					
	Direct Defiance	50	1.69	0.804	0.47 – 2.91
	Passive Noncompliance	0	--	--	--
	Simple Refusal	3	-.52	0.271	-4.13 – 3.09
	Negotiation	0	--	--	--
	Slowness to Respond	2	2.51	0.705	-2.55 – 7.57
	Whining	0	--	--	--
	Other/Not Specified	103	1.53	0.000**	0.82 – 2.24
Treatment Type					
	Behavior Momentum	0	--	--	--
	Errorless Compliance Training	0	--	--	--
	Nonverbal Behavior	0	--	--	--
	Precision Request/Effective Instruction Delivery	0	--	--	--
	Positive and Negative Reinforcement	13	1.96	0.512	0.35 – 3.57
	Extinction	1	6.87*	0.033	1.93 – 11.81
	Punishment	7	1.71	0.787	-0.37 – 3.79
	Parent Training	63	1.42	0.000**	0.77 – 2.07
	Teacher Training	5	0.06	0.246	-2.21 – 2.33
	Child Training	2	2.19	0.674	-1.38 – 5.76
Functional Behavior Assessment/Analysis					
	Functional Behavior Assessment	0	--	--	--
	Functional Analysis	2	0.89	0.798	-4.15 – 5.93

Table 9. Continued

Moderator Variable		*N*	Mean Effect Size	*p*-value	95% Confidence Interval
Setting					
	School	9	1.16	0.920	-0.80 – 3.12
	Home	17	1.06	0.053**	0.00 – 2.12
	Clinic	47	1.77	0.284	0.50 – 3.04
	Residential/Institution/Hospital	1	4.71	0.163	-0.39 – 9.81
Implementer					
	Professor/Clinician	49	1.59	0.409	0.32 – 2.86
	Assistant	6	1.89	0.130	-0.40 – 4.18
	Parent	15	1.12	0.010**	0.06 – 2.18
	Teacher	2	0.68	0.297	-3.00 – 4.36
Article Type					
	Journal Article	68	1.55	0.000**	0.92 – 2.18
	Dissertation/Thesis	11	1.44	0.847	0.32 – 2.56

*Clinically Significant

**Used as Control Group

--Not Included in Analysis (Data not Available)

Research Question #2: What is the global effect size (within each of the design categories) for all the interventions reviewed in each of the design study categories (single-subject designs, mixed and between-subjects designs, within-subjects designs) to prevent or reduce noncompliant behavior in children, adolescents, and young adults using HLM?

In order to determine if there was a significant treatment effect across all included subjects, a global effect size for single-subject design studies and group design studies was calculated using HLM.

Single-subject Design Studies

The grand mean effect size was 2.95, which was significant, $t(178)=12.54$, $p<.001$. This can be considered a large treatment effect (Cohen, 1988). There is a 95% chance that the grand mean effect size lies between 2.48 and 3.42.

Group Design Studies

The grand mean effect size was 1.54, which was significant, $t(78)=5.393$, $p<.001$. This can be considered a large treatment effect (Cohen, 1988). There is a 95% chance that the grand mean effect size lies between .97 and 2.11.

Research Question #3: To what extent do obtained effect sizes from HLM differ on the effectiveness of individual treatments for noncompliance depending on the type of intervention used (manipulation of antecedents, manipulation of behavior, manipulation of consequences, training: parent, teacher, child)?

Single-subject Design Studies

The training group (parent, teacher, child) was used as the control group to analyze treatment effectiveness for type of intervention. The composite effect size for the Training Intervention group was 2.78, $t(176)=6.932$. The composite effect size for the Antecedent Manipulation group was 3.56, $t(176)=1.668$, $p=0.097$. The composite effect size for the Consequence Manipulation group was 2.48, $t(176)=-0.672$, $p=0.502$. According to HLM, all three intervention types are effective in reducing noncompliant behavior and/or increasing compliant behavior, but there is not statistical significance between the three groups, $p>.05$.

Group Design Studies

There were no group design studies included in the current meta-analysis that utilized any type of antecedent intervention. Therefore, the only intervention types included in the analysis were manipulation of consequences and training, which included parent, teacher, and child training.

The training group was used as the control group, just as it was for single-subject design studies. The composite effect size for the Training Intervention group was 1.36 $t(77)=4.069$. The composite effect size for the Consequence Manipulation group was 2.2, $t(77)=1.459$, $p=0.149$. According to HLM, both intervention types are effective in reducing noncompliant behavior and/or increasing compliant behavior, but there is not statistical significance between the two groups, $p>.05$.

Research Question #4: To what extent do the obtained effect sizes from HLM differ on the effectiveness of individual treatments for noncompliance depending on the

variable that is manipulated (behavior momentum, errorless compliance training, nonverbal behaviors, precision request/effective instruction delivery, positive and negative reinforcement, extinction, punishment, parent training, teacher training, child training)?

Single-subject Design Studies

The parent-training group was used as the control group to analyze treatment effectiveness for type of treatment. According to HLM, all treatments are effective in reducing noncompliant behavior and/or increasing compliant behavior, but there is not statistical significance between the groups, $p>.05$, with the exception of those in the behavior momentum group.

The difference between the parent-training group and the behavior momentum group was statistically significant, $p=0.049$. The grand mean effect size for behavior momentum was 4.33, $t(169)=1.983$, $p<.05$. This means that those subjects who received behavioral momentum as a treatment had a significant decrease in their noncompliant behavior and/or a significant increase in their compliant behavior. Figure 1 shows single-subject treatment effectiveness by treatment type (behavior momentum).

Group Design Studies

The parent-training group, in keeping consistent with single-subject studies, was used as the control group to analyze treatment effectiveness for type of treatment. According to HLM, all treatments are effective in reducing noncompliant behavior and/or increasing compliant behavior, but there is not statistical significance between the groups, $p>.05$, with the exception of those in the extinction group. The difference between the

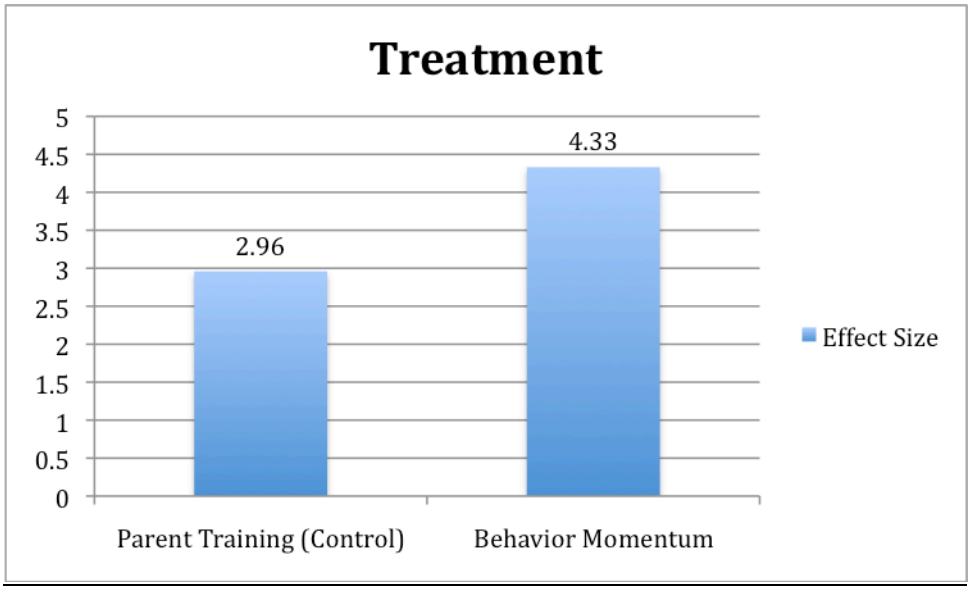

Figure 1. Treatment Effectiveness by Treatment Type (Single-subject)

parent-training group and the extinction group was statistically significant, p=0.033. The grand mean effect size for extinction was 6.87, $t(73)=2.165$, $p<.05$. This means that those subjects who received extinction as a treatment had a significant decrease in their noncompliant behavior and/or a significant increase in their compliant behavior. However, this result must be interpreted with caution. There was only one group design study that included extinction as a treatment type. Multiparameter testing yielded a non-significant p-value. Raudenbush and Bryk (2002) state "One benefit of Multiparameter hypothesis tests is protection against the heightened probability of type I errors that arises from performing many univariate tests" (p. 60). Although univariate testing resulted in a significant difference between parent training and extinction, this could be due to a Type I error and must be interpreted with caution. Figure 2 shows single-subject treatment effectiveness by treatment type (extinction).

Research Question #5: To what extent does a child's diagnosis (ADHD, ODD, CD, etc.) affect the effect size result of intervention effectiveness of individual treatments for noncompliance when HLM is used?

Single-subject Design Studies

Diagnosis of the subject, when compared to those subjects with no diagnosis given, was not statistically significant, $p>.05$, for any diagnosis with the exception of Mood Disorder. This means that for the subjects diagnosed with ADHD, ODD, CD, Adjustment Disorder with Disorder of Conduct, Autism, Mental Retardation, and Enuresis, diagnosis did not influence treatment effectiveness more than could be accounted for by chance.

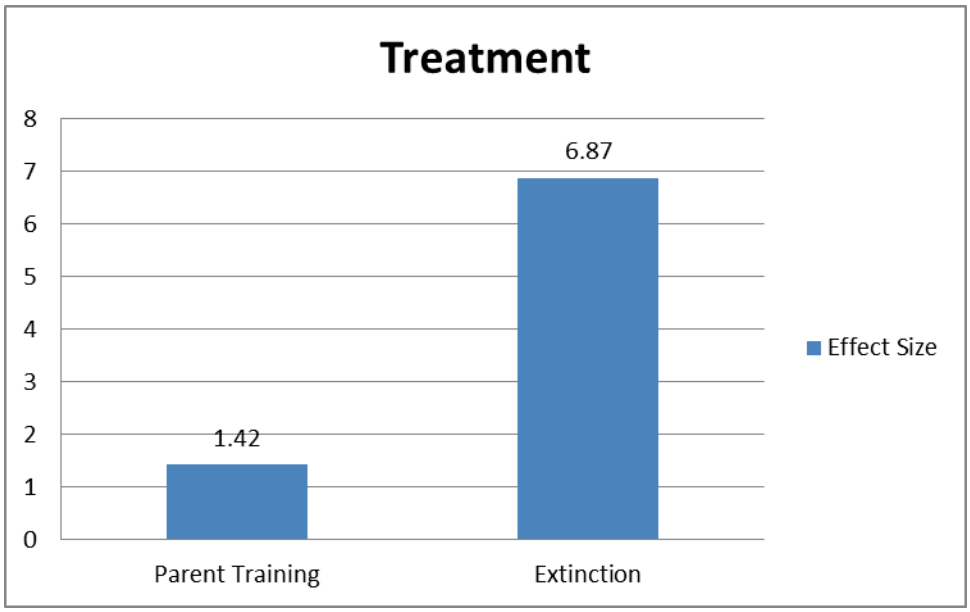

Figure 2. Treatment Effectiveness by Treatment Type (Group)

The difference between no diagnosis and Mood Disorder was statistically significant, p=0.046. The grand mean effect size for Mood Disorder was 4.82, $t(449)=1.998$, $p<.05$. This means that for the subjects diagnosed with Mood Disorder treatment for noncompliance was more effective than for subjects having other diagnoses or no diagnosis. Figure 3 shows single-subject treatment effectiveness by diagnosis.

Group Design Studies

Diagnosis of the subject, when compared to those subjects with no diagnosis given, was not statistically significant, $p>.05$, for any diagnosis with the exception of Adjustment Disorder with Disorder of Conduct. This means that for the subjects diagnosed with ADHD, ODD, CD, Autism, Mental Retardation, Mood Disorder, Enuresis, and Encopresis diagnosis did not influence treatment effectiveness more than could be accounted for by chance.

The difference between no diagnosis and Adjustment Disorder with Disorder of Conduct was statistically significant, p=0.012. The grand mean effect size for this disorder was 8.32, $t(68)=2.586$, $p<.05$. This means that for the subjects diagnosed with Adjustment Disorder with Disorder of Conduct treatment for noncompliance was more effective than for subjects having other diagnoses or no diagnosis. Results must be interpreted with caution, however, given that only 1 subject had a diagnosis of Adjustment Disorder with Disorder of Conduct. More studies with subjects diagnosed with Adjustment Disorder with Disorder of Conduct would result in more power and a result could be more easily detected. Figure 4 shows group design treatment effectiveness by diagnosis.

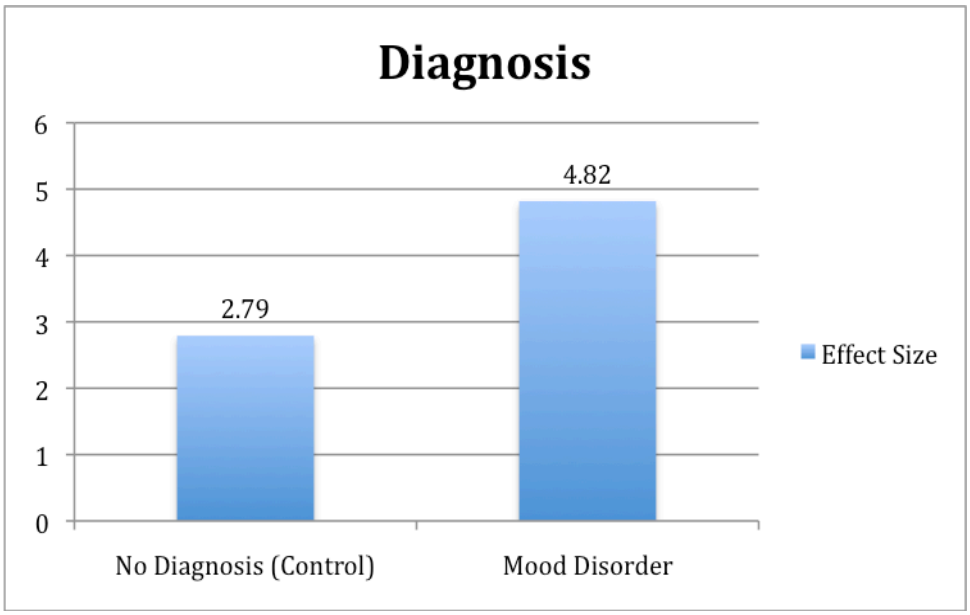

Figure 3. Treatment Effectiveness by Diagnosis (Single-subject)

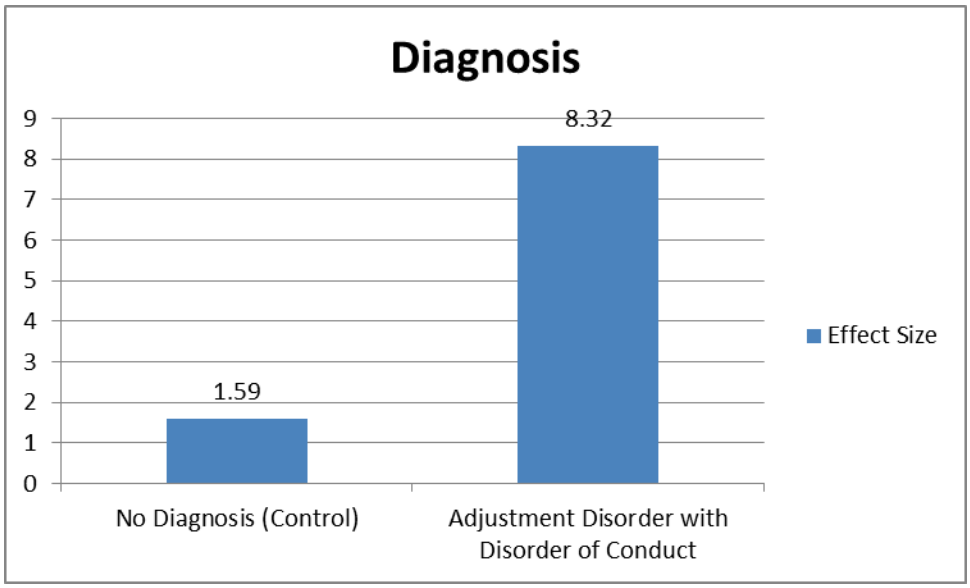

Figure 4. Treatment Effectiveness by Diagnosis (Group)

Research Question #6: Using HLM is the mean effect size representing the effectiveness of individual treatments by age of the participants different from zero?

Single-subject Design Studies

Age of subjects was examined using group and grand mean centering (Raudenbush & Bryk, 2002). The obtained effect size for age is 2.96, $t(456)=2.140$, $p=0.033$, which is clinically significant. Every month that age increases the treatment effect increases by 0.008 standard deviations. This means that as the age of the child increases, treatment effectiveness increases. A summary of single-subject age statistics can be found in Table 10. A simple scatter plot of single-subject age statistics can be found in Figure 5. The simple scatter plot shows a negative slope while the statistics using group and grand mean centering demonstrates a positive slope. To explain the difference between the two results, further research needs to be conducted.

Group Design Studies

Age of subjects for group design studies was examined using age grand mean. The obtained effect size for age of subjects in group design studies is 1.54, $t(77)=1.337$, $p=0.185$. When age of the subject is added to the level 2 analysis, obtained effect sizes from HLM are not significantly different from zero. This indicates that age of the participants did not influence treatment effectiveness. Table 11 summarizes the age statistics for group design studies.

Research Question #7: Using HLM is the mean effect size representing the effectiveness of individual treatments by gender of the participants different from zero?

Table 10. Age (in years) Summary Data (Single-subject)

Mean Age	**Range**	**Effect Size**	**ES Change by Age**	***p*-value**
7.0	2.0-22.0	2.96	0.008	0.033*

*Clinically Significant

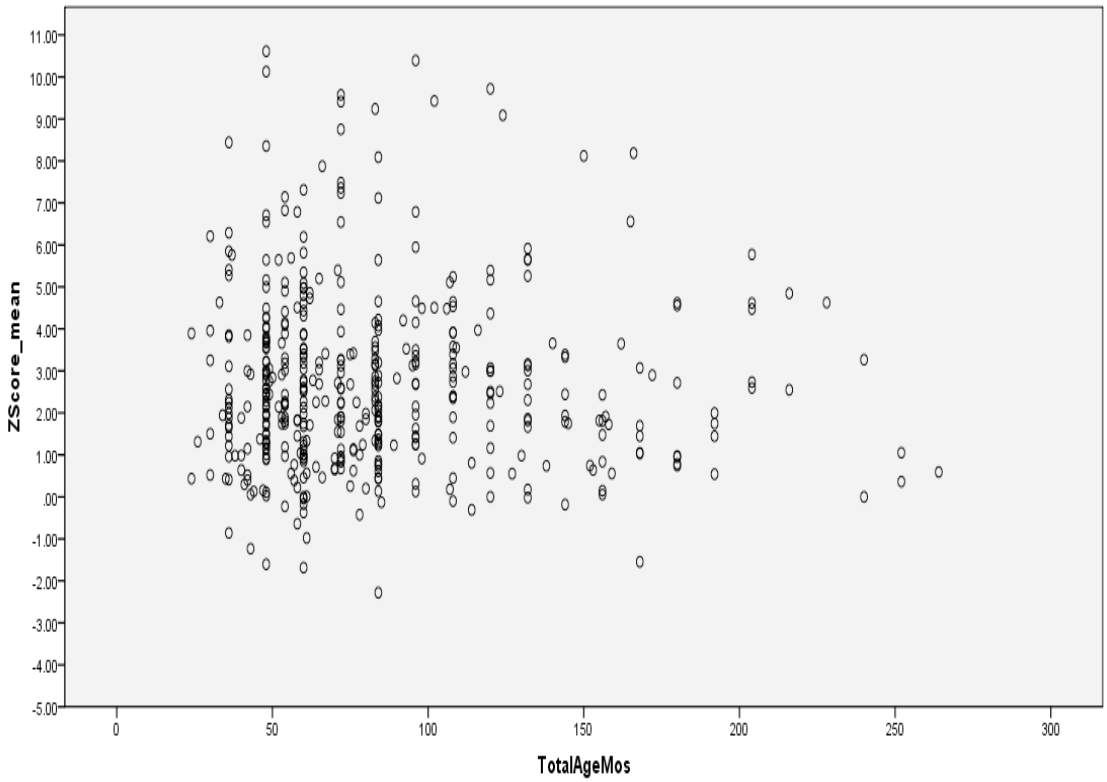

Figure 5. Age Scatter Plot (Single-subject)

Table 11. Age (in years) Summary Data (Group)

Mean Age	**Range**	**Effect Size**	**ES Change by Age**	***p*-value**
6.2	2.0-13.83	1.54	0.013	0.185

*Clinically Significant

Single-subject Design Studies

Obtained effect sizes from HLM are different from zero when gender of the participant is added to the Level 2 model. However, obtained effect sizes are not statistically significant, p=.521. That means there is not a statistically significant difference in treatment effects for males or females.

Group Design Studies

Gender for group design studies was not analyzed due to the limited number of studies that reported gender for their participants.

Research Question #8: Using HLM is the mean effect size representing the effectiveness of individual treatments by setting (school, clinic, home, residential/institution/hospital) different from zero?

Single-subject Design Studies

Home was used as the control group to analyze treatment effectiveness for setting. According to HLM, all setting sites are effective in reducing noncompliant behavior and/or increasing compliant behavior, but there is not statistical significance between the groups, p>.05, meaning one setting is not more effective than the other.

Group Design Studies

Home was again used as the control group to analyze treatment effectiveness for setting with group design studies. According to HLM, p=0.053, meaning setting does not have a significant influence on treatment effectiveness.

Research Question #9: Using HLM is the mean effect size representing the effectiveness of individual treatments based on who implemented the treatment (teacher,

clinician, parent, assistant) different from zero?

Single-subject Design Studies

The parent group was used as the control group to analyze treatment effectiveness for implementer of the treatment. According to HLM, all treatment implementers are effective in reducing noncompliant behavior and/or increasing compliant behavior, but there is not statistical significance between the groups, $p>.05$, with the exception of those in the teacher group.

The difference between the parent group and the teacher group was statistically significant, $p=0.009$. The grand mean effect size for the teacher group was 4.35, $t(175)=2.677$, $p<.01$. This means that those subjects who had a teacher as the implementer of the treatment had a significant decrease in their noncompliant behavior and/or a significant increase in their compliant behavior. Figure 6 shows single-subject treatment effectiveness by implementer (teacher).

Group Design Studies

The parent group was used as the control group to analyze treatment effectiveness for implementer of the treatment with group design studies. This is consistent with the control group for single-subject studies. According to HLM, all treatment implementers are effective in reducing noncompliant behavior and/or increasing compliant behavior, $p=0.010$, but there is not statistical significance between the groups, $p>.05$. This means that one implementer was no more effective than another in studies aiming to reduce noncompliant behavior and/or increase compliant behavior.

Research Question #10: To what extent do the obtained effect sizes from

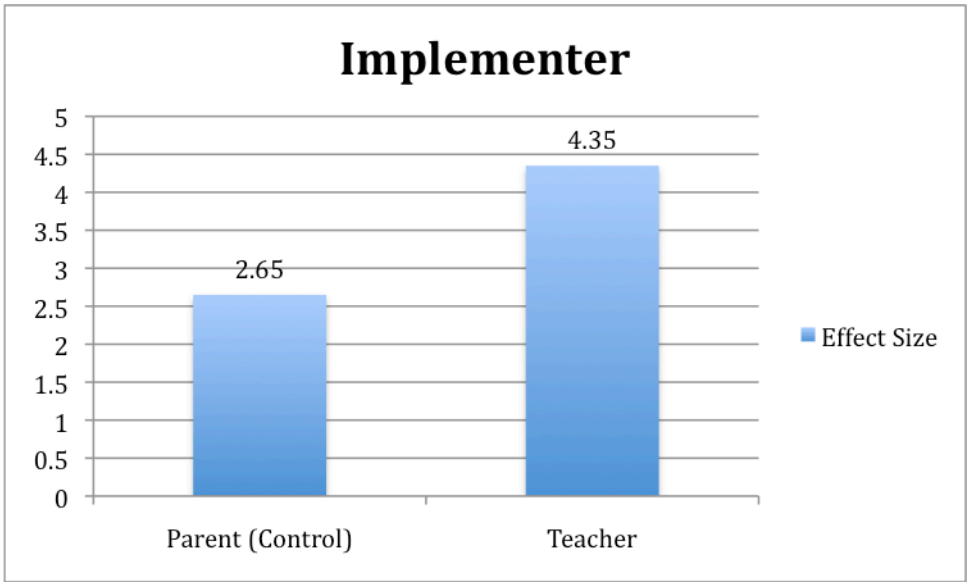

Figure 6. Treatment Effectiveness by Implementer (Single-subject)

HLM differ on the effectiveness of individual treatments depending on whether a Functional Behavior Assessment or functional analysis was performed?

Single-subject Design Studies

The control group in this meta-analysis included all studies in which a functional behavior assessment or a functional analysis was not part of the original study. The composite effect size for the No FBA/FA was 2.78, $t(176)=6.932$. The composite effect size for the Functional Behavior Assessment group was 3.57, $t(176)=0.946$, $p=0.346$. The composite effect size for the Functional Analysis group was 3.92, $t(176)=1.605$, $p=0.110$. This means that functional behavior assessments or functional analyses did not influence treatment effectiveness more than could be accounted for by chance, $p>.05$.

Group Design Studies

The control group included all studies in which a functional behavior assessment or a functional analysis was not part of the original study. Only Functional Analysis data were compared to the control group because there were no group design studies that included a Functional Behavior Assessment. The composite effect size for the No FBA/FA was 1.55, $t(77)=5.355$. The composite effect size for the Functional Analysis group was 0.89 $t(77)=-0.256$, $p=0.798$. This means that functional analyses did not influence treatment effectiveness more than could be accounted for by chance, $p>.05$.

Research Question #11: Using HLM is the mean effect size representing the effectiveness of individual treatments by type of study (journal article, book chapters etc. vs. thesis/dissertation) different from zero?

Single-subject Design Studies

Obtained effect sizes from HLM are different from zero when type of study is added to the Level 2 model. However, obtained effect sizes are not statistically significant, p=0.977. That means there is not a statistically significant difference in treatment effects depending on type of study used in the analysis.

Group Design Studies

Obtained effect sizes from HLM are different from zero when type of study is added to the Level 2 model. However, obtained effect sizes are not statistically significant, p=0.847. That means there is not a statistically significant difference in treatment effects depending on type of study used in the analysis.

Research Question #12: How many new, filed, or unretrieved studies averaging no effect would be needed to bring the overall combined magnitude of effect to "small"?

Single-subject Design Studies

The N_{fs}, or the number of new, filed, or unretrieved studies averaging no effect that would be needed to bring the overall combined magnitude of effect to some negligible level was calculated using Cohen's guidelines for single-subject design studies. An additional 905 studies averaging null-results would be needed to bring the overall level 1 HLM effect size of 2.95 to a "small effect."

Group Design Studies

The N_{fs}, or the number of new, filed, or unretrieved studies averaging no effect that would be needed to bring the overall combined magnitude of effect to some

negligible level was calculated using Cohen's guidelines. An additional 529 studies averaging null-results would be needed to bring the overall level 1 HLM effect size of 1.54 to a "small effect."

CHAPTER IV

DISCUSSION

The first research question to be addressed in the present study concerned the various types of noncompliant behavior including direct defiance, passive noncompliance, simple refusal, negotiation, whining, slowness to respond, etc. The author sought to determine if there was a significant difference between the types of noncompliance to find out if all types of noncompliance could be examined together in one meta-analysis. A significant difference was not found between noncompliance types, and therefore, the author determined that all types of noncompliant behavior could be examined together and the rest of the questions in the meta-analysis could be answered.

Results for the current meta-analysis indicate that with the studies that were included in the meta-analysis, treatments used to reduce noncompliant behavior and/or increase compliant behavior in children, adolescents, and young adults are effective. According to Cohen (1988) an effect size of .8 demonstrates a large treatment effect, one of .5 demonstrates a medium treatment effect, and one of .2 demonstrates a small treatment effect. When HLM was used to calculate a global effect size for single-subject studies, a large treatment effect of 2.95 was detected. When HLM was used to calculate a global effect size for group design studies, the result was 1.54, which can also be considered a large treatment effect. Although here is a difference between the effect size

obtained for single-subject design studies and the effect size obtained for group design studies, it is not possible to compare the two and determine if one type is better than the other. Lipsey and Wilson (2000) suggest analyzing each experimental finding separately in order to overcome statistical constraints due to research findings and statistics of different sorts.

Examination of Intervention Type

Intervention types contained within in the study include manipulation of antecedents, manipulation of consequences, and interventions designed to train parents, children, and teachers. In examining the three different intervention types for single-subject design studies, similar effect sizes were found. When HLM was used, the composite effect size for antecedent manipulation interventions was 3.56, for consequence manipulation interventions was 2.48, and for training interventions was 2.78. All three intervention types were found to be effective in reducing noncompliant behavior and/or increasing compliant behavior, but although the treatment effect is large, there was not a statistically significant difference in the effectiveness of the three intervention types (antecedent manipulation interventions, p=.097; consequence manipulation interventions, p=.502).

Effect size analyses of intervention type with group design studies only included an analysis of manipulation of consequences and training because no manipulation of antecedent intervention studies were found that met the study inclusion criteria. Similar effect size composites were found when HLM was used. The composite effect size for manipulation of consequence studies was 2.2, while the composite effect size for training studies was 1.36. Treatment effects are large for both treatment types, but there is not a

statistically significant difference in the effectiveness of the intervention types analyzed (consequence manipulation interventions, p=0.149).

Examination of Moderator Variables

Homogeneity analyses were conducted for each of the study designs with HLM and significant heterogeneity was found within effect size estimates. This indicates that one or more features were present in some cases and absent in others, which affected the magnitude of treatment outcomes. These features, or moderator variables, were examined using HLM to determine whether outcome might vary across subject or intervention characteristics. These moderator variables included the participant's diagnosis, type of noncompliant behavior, treatment type, whether a functional behavioral assessment or a functional analysis of the problem behavior was conducted before the treatment was implemented, participant's age, participant's gender, treatment setting, implementer of the treatment, and the source from which the treatment came (thesis/dissertation vs. journal article).

Most of the moderator variables included in the current analysis could not reliably explain the variance in treatment effectiveness between subjects and within the three treatment types. The reasons for these nonsignificant treatment findings were diverse in nature. Some of the most obvious concerns include the fact that the relatively small number of studies included in some of the group design analyses had a large effect on the impact on the outcome. Treatment outcomes in both single-subject design studies and group design studies were also quite variable. These concerns made it difficult in some instances to draw meaningful and statistically significant conclusions about what specific factors may be influencing treatment effectiveness.

Single-subject Design Results Discussion

Single-subject moderator variables were examined using HLM. Most of the moderator variables did not return significant results, meaning that within each of the categories, such as noncompliance type or setting, the variables were not significantly different from one another. There were some significant results and they will be discussed in the following paragraphs.

The diagnoses examined in the current meta-analysis included ADHD, CD, ODD, Adjustment Disorder with Disorder of Conduct, Autism, Mental Retardation, Mood Disorder, Traumatic Brain Injury, Enuresis, and Encopresis. Participants diagnosed with Mood Disorder decreased their noncompliant behavior and/or increased their compliant behavior at a greater rate than those diagnosed with other disorders or those participants who had no diagnosis, p=0.046. However, this must be interpreted with caution for several reasons. First, very few subjects, N=6, were diagnosed with mood disorder. Second, although significant results were found with univariate testing, multiparameter testing yielded nonsignificant results, p=0.374.

Although the mood disorder result in this study must be interpreted with caution, it is still important to consider. "Depression that occurs during childhood and adolescence is likely to be preceded, accompanied, or followed by other psychiatric disorders" (Costello et al., 2002, p. 532). A meta-analysis conducted by Angold, Costello, and Erkanli (1999) showed that anxiety disorders were 8.2 times as common among depressed as nondepressed children and adolescents, conduct and oppositional disorders were 6.6 times as common, and ADHD was 5.5 times as common after controlling for other comorbidities among disorders. Children with bipolar disorder also

reflect a range of other diagnoses including ADHD, anxiety disorders including obsessive compulsive disorder, major depressive disorder, and oppositional defiant and/or conduct disorder (Bradfield, 2010). Treatment for childhood mood disorders has generally revolved around pharmacological and psychotherapeutic treatments (Costello et al., 2002). Many questions remain about the safety and efficacy of pharmacological treatments for childhood and adolescent mood disorders (Emslie & Mayes, 2001) and the use of medication in that population has received insufficient attention, with the majority of the research addressing how adults respond to medication. However, children and adolescents are frequently treated with medication despite of insufficient proof of the effectiveness of those medications (Bradfield, 2010). Therefore, it is important to consider treatment alternatives and the current study offers support for that conclusion.

The treatment types examined in the meta-analysis include behavior momentum, errorless compliance training, nonverbal behavior, precision request and effective instruction delivery, positive and negative reinforcement, extinction, punishment, parent training, teacher training, and child training. The treatment types under manipulation of antecedents include behavior momentum, errorless compliance training, nonverbal behavior, and precision request and effective instruction delivery. The treatment types under manipulation of consequences include positive and negative reinforcement, extinction, and punishment. The treatment types included under training include parent training, teacher training, and child training. Participants who received behavioral momentum as a treatment decreased their noncompliant behavior and/or increased their compliant behavior at a greater rate than those given other treatments, p=0.049. Overall, behavior momentum was found to be the most effective treatment in reducing

noncompliant behavior or increasing compliant behavior with individual participants.

Participant age was also a significant factor in the current meta-analysis. Age was examined using group and grand mean centering as recommended by Raudenbush and Bryk, 2002. Every month that age increases, the treatment effect increases by 0.008 standard deviations. This is a 0.096 standard deviation change per year. Although this is a relative minor change, by the time a child is 17 years old there is a 1.536 standard deviation change, which can be considered significant. By the time a child is 22 years of age there is a 2.016 standard deviation change, which can also be considered significant. However, a simple scatter plot demonstrated a negative slope while the statistics using group and grand mean centering demonstrated a positive slope. Further research is necessary to explain the results of participant age in single-subject design studies.

The various implementers of treatments in this meta-analysis include professor/clinician, assistant, parent, and teacher. Interventions implemented by teachers, p=0.009, were found to be significantly more effective than those implemented by a participant's parent. This can be considered a significant effect. However, the reason for this effect remains unclear. More research is needed to adequately explain this effect.

The effectiveness of functional behavior assessments and functional analyses were examined. Functional behavior assessments and functional analysis did not influence treatment effectiveness more than could be accounted for by chance. Previous meta-analysis research conducted at the University of Utah by Backner (2009), Christiansen (2005), and Steffey (2006) have found similar results. Based on the current study as well as other studies, functional behavior assessments and functional analyses

do not appear to significantly influence treatment outcome.

Group Design Results Discussion

Group moderator variables were also examined using HLM. Most of the moderator variables for group design studies did not return significant results, and those that did must be interpreted with caution due to small numbers.

All treatment diagnosis categories were included in the group design diagnosis analysis. Participants diagnosed with Adjustment Disorder with Disorder of Conduct decreased their noncompliant behavior and/or increased their compliant behavior at a greater rate than those diagnosed with other disorders or those participants who had no diagnosis, p=0.012. However, this result must be interpreted with caution. Only one study included a participant who was diagnosed with Adjustment Disorder with Disorder of Conduct. More research is needed to determine if children, adolescents, and young adults diagnosed with Adjustment Disorder with Disorder of Conduct really do respond better to treatments designed to decrease noncompliance and/or increase compliance or if the significant result was merely due to the limited number of studies.

The following treatment types were included in the analysis: positive and negative reinforcement, extinction, punishment, parent training, teacher training, and child training. There were no manipulation of antecedent treatments found that met the inclusion criteria. Participants who received extinction as a treatment decreased their noncompliant behavior and/or increased their compliant behavior at a greater rate than those given other treatments, p=0.033. These results must be interpreted with caution due to the fact that only one study in the group design meta-analysis included extinction as a treatment. More research is needed to determine if children, adolescents, and young

adults who receive extinction as a treatment really do have better treatment results than those who do not.

Implications for Research

Important questions still need to be answered to determine specifically what factors influence treatment effectiveness on the whole. Further research is necessary to specifically describe the factors that would most aid professionals in selecting appropriate treatments for children, adolescents, and young adults exhibiting noncompliant behavior so that treatment effects can be maximized.

Perhaps the most pressing research issue is the need to include follow-up data for the studies included in this meta-analysis in another meta-analysis. Follow-up data would inform practitioners and researchers about what moderator variables have an impact on participants after treatment has been terminated. This is important because moderator variables that may not have been significant in the initial analysis may prove to be more crucial in the long-term. It is also necessary to determine if moderator variables that were significant during treatment continue to have an impact at follow-up or if they no longer have an effect after treatment has ended.

Further research is also necessary to examine the significant age finding in the current meta-analysis. The current analysis concluded that with single-subject participants that every month that age increases the treatment effect increases by 0.008 standard deviations. This means that as the age of the child increases, treatment effectiveness also increases. However, further research is needed to explain this result. Research in this area may include seeing if this result could be duplicated, investigating if there is an age where treatment effectiveness begins to decrease or if certain ages are

optimal over others for treating noncompliance, and if certain ages are better treated with particular types of interventions.

Teachers as implementers in single-subject designs were another significant treatment result in the current meta-analysis. Further research is necessary to determine what specifically accounted for this result. It would also be important to determine if certain types of noncompliant behavior or children with certain diagnoses respond well when a teacher implements the treatment. Finally, it may be wise to determine if certain types of treatments are more effective than others if implemented by a teacher.

Behavior momentum was a significant treatment for those in single-subject design studies. Further research is needed to determine who behavior momentum works the best for and to maximize its effectiveness. It may also be relevant to determine what ages and with what disorders behavior momentum works best.

Although Adjustment Disorder with Disorder of Conduct was a significant finding for diagnosis and extinction was a significant finding for treatment type among group design studies further research with these moderator variables is needed. The number of participants diagnosed with Adjustment Disorder with Disorder of Conduct was 1 and only one study used extinction as a treatment. It makes sense that it is determined if these variables really do have a significant effect or if the significant results were an anomaly due to small numbers.

Medicine, or drug therapy, was not included in the current meta-analysis. This could be an important area to study in future research. Drug therapy is often used in conjunction with other interventions to treat specific disorders. It would be important to determine what effect medication has on reducing noncompliance among children,

adolescents, and young adults.

Additional criteria for publication of research may be useful to gain a better understanding of the specific factors that moderate treatment effectiveness. This will enable researchers to gain a better understanding of the specific factors influencing the effectiveness of treatment for noncompliant behavior. For example, precise noncompliance types are rarely published in journal articles. Gender of participants in group design studies was generally not reported. This may be something that researchers would want to include in the future so that practitioners can determine if certain treatments work better for males or females. It may also be useful to conduct research using manipulation of antecedents in group design studies. Although manipulation of antecedents was widely used in single-subject research, it was not generally considered as a treatment for subjects participating in group design studies. There was no manipulation of antecedent studies that met the inclusion criteria for the current meta-analysis.

Implications for Practice

Treatments for reducing noncompliant and/or increasing compliant behavior in children, adolescents, and young adults are effective according to the results of this meta-analysis. In the current meta-analysis, all three intervention types are effective in reducing noncompliant behavior and/or increasing compliant behavior in children, adolescents, and young adults. When selecting treatments for this population, this detail should be an important factor to keep in mind.

Behavior momentum was a significant treatment for those in single-subject design studies. Belfiore, Lee, Scheeler, and Klein (2002) propose that compliance with an easy-hard task sequence appears to reduce resistance to compliance with difficult tasks.

Momentum is therefore established within a group or response class of behaviors. This is an important finding because behavior momentum is considered an antecedent intervention and can be used to prevent noncompliant behavior from occurring or from getting worse. In fact, a meta-analysis conducted by Lee (2005) found that behavior momentum (high-*p* request sequences) is effective in increasing compliance and methods that prevent noncompliance may produce long lasting results and may be more efficient than other forms of treatment.

Another important finding concerns the effectiveness of using teachers as implementers of treatments for children, adolescents, and young adults who are noncompliant. Teachers report that compliance is very important in classroom situations (McMahon & Forehand, 2003) and several large surveys conducted with teachers have found that "child complies with teacher commands" and "follows established classroom rules" were the two most important classroom behaviors that a child can possess as rated by teachers (Walker, 1995). Practitioners should be aware that utilizing a teacher to treat noncompliance can be not only a benefit to the child,
but to the teacher as well.

Limitations

There are several limitations to the present meta-analysis. One of the principal limitations is the large variability among treatment outcomes not controlled or accounted for by the currently selected moderator variables. A large number of moderator variables were also used in the study and this may also be a cause of a great deal of variance in the study's outcome. Even though the interventions included in the analysis were effective, there was a large amount of variability. This variance was not accounted for by most of

the moderator variables. This was especially problematic for group design studies because of the limited number of studies for each moderator variable.

In addition, the group effect size was negatively affected by articles not having the $F_{AxB.}$. In order to calculate the effect size for each group article it was first necessary to calculate the $MS_{BxS/A.}$ If the *F* score statistic was available the calculation was $MS_{AxB}/F_{AxB.}$ However, if F_{AxB} was unknown, then the calculation of MS_{AxB} was $\sigma^{\wedge 2}_e/N_e + \sigma^{\wedge 2}_c/N_c - [2r (\sigma^{\wedge 2}_e/N_e)^{\wedge 1/2} (\sigma^{\wedge 2}_c/N_c)^{\wedge 1/2}]$. In this scenario r was set to 0 thus eliminating the second half of the equation. This assumption minimized the effect size that was calculated using $MS_{BxS/A.}$

Another limitation of the current study was the fact that a limited number of studies reported the type of noncompliant behavior that the child, adolescent, or young adult was exhibiting. It was also very difficult to code the type of noncompliant behavior that the subject(s) were exhibiting most of the time. Noncompliance has been described as a keystone behavior (McMahon & Forehand, 2003) or a "gatekey" behavior that leads to more serious behaviors such as peer conflicts, bullying, stealing, vandalism, oppositional-defiant behavior (Walker & Sylwester, 1998), and other conduct problems. Research has also demonstrated that when clinicians target noncompliance other conduct problem behaviors improve as well (McMahon & Forehand, 2003). Furthermore, research suggests that noncompliance is correlated with aggression and antisocial behavior throughout childhood. It has also been demonstrated that there is a close association between noncompliance, aggression, and norm-breaking behavior in older children (Kalb & Loeber, 2003). Therefore, it may be helpful in the future to better determine the type of noncompliant that is being exhibited so that appropriate treatments

relevant to noncompliance type and age of the child are selected to ensure that treatment is maximized.

Another limitation of the current study is the fact that studies on the treatment of noncompliance have not focused exclusively on how a child's diagnosis influences noncompliant behavior and treatment outcome. Although noncompliance is typically associated with CD and ODD (McMahon & Forehand, 2003) many other disorders have not been studied as extensively. This invariably leads to a smaller sample size from which to draw subjects that meet the inclusion criteria for use in the current meta-analysis.

Conclusions

In spite of the limitations mentioned above, the results of the current meta-analysis indicate that treatments used to noncompliant behavior and/or increase compliant behavior in children, adolescents, and young adults are effective. It was found that behavior momentum is an effective antecedent intervention and that teachers can have a positive impact when they are utilized in implementing treatment. Other results, such as noncompliance treatment working well with those diagnosed with mood disorder and adjustment disorder with disorder of conduct should be interpreted with caution due to the limited number of studies and participants that were included in the analysis. More research is needed to determine specific factors that influence treatment effectiveness. In summary, the current meta-analysis demonstrated that techniques used to reduce noncompliant behavior in children, adolescents, and young adults are effective.

APPENDIX A

SINGLE-SUBJECT DESIGN DATA

Table 12. Key: Single-subject Design Data

	Abbreviation		
Source	Source (Article source used in dissertation)		
Study Number	Sty		
Subject ID Number	Sub ID		
Diagnosis	Diag	1	ADHD
		2	ODD
		3	CD
		4	Adj. Dis. with Dis. of Conduct
		5	Autism
		6	Mental Retardation
		7	Mood Disorder
		8	Traumatic Brain Injury
		9	Enuresis
		10	Encopresis
		11	Not Specified
		12	Multiple Diagnosis
Intervention Type	Int	1	Manipulation of Antecedent
		2	Manipulation of Consequence
		3	Training: Parent, Teacher, Child
		4	Not Specified
Noncompliance Type	Ncmp	1	Direct Defiance
		2	Passive Noncompliance
		3	Simple Refusal
		4	Negotiation
		5	Slowness to Respond
		6	Whining
		7	Other/Not Specified
Treatment Type	TX	1	Behavior Momentum
		2	Errorless Compliance Training
		3	Nonverbal Behavior
		4	Precision Request/Effective Instruction Delivery
		5	Reinforcement
		6	Extinction
		7	Punishment
		8	Parent Training
		9	Teacher Training
		10	Child Training
		11	Not Specified
Functional Behavior Assessment/Functional Analysis	FBA/FA	1	FBA
		2	FA
		3	Not Specified/None

Table 12. Continued

	Abbreviation		
Setting	Set	1	School
		2	Home
		3	Clinic
		4	Residential/Institution/Hospital
		5	Not Specified
Implementer	Imp	1	Professor/Clinician
		2	Assistant
		3	Parent
		4	Teacher
		5	Other/Not Specified
Article Source	Art	1	Journal Article
		2	Dissertation/Thesis
Z-score	Zscr		

Table 13. Single-subject Design Data

Source	Sty	Sub ID	Diag	Int	Ncmp	T X	FBA/ FA	Set	Imp	Art	Zscr
Warzak W. J., et al., 2009	1	1	11	2	1	7	3	3	1	1	0.16
Warzak W. J., et al., 2009	1	2	11	2	1	7	3	3	1	1	-0.64
Ducharme J. M., et al., 2005	2	1	6	1	1	2	3	1	1	1	3.53
Ducharme J. M., et al., 2005	2	2	6	1	1	2	3	1	1	1	1.68
Ducharme J. M., et al., 1994	3	1	6	1	3	2	3	2	1	1	3.33
Ducharme J. M., et al., 1994	3	2	6	1	3	2	3	2	1	1	4.56
Glass M., et al., 1993	4	1	11	1	1	3	3	1	1	1	6.56
DeLeon I. G., et al., 2001	5	1	5	2	1	5	2	4	1	1	8.12
Freeman K. A., et al., 2004	6	1	12	3	1	9	3	4	4	1	0.05
Dunlap G., et al., 1991	7	1	12	3	1	9	1	1	4	1	1.94
Kozlowski A., et al., 2009	8	1	5	2	7	5	1	1	4	1	2.73
Tyroler M. J., et al., 1980	9	1	11	2	1	5	3	1	2	1	1.31
Friman P. C., et al., 1997	10	1	11	2	1	5	3	4	4	1	1.79
Friman P. C., et al., 1997	10	2	11	2	1	5	3	4	4	1	3.07
Friman P. C., et al., 1997	10	3	12	2	1	5	3	4	4	1	1.81
Friman P. C., et al., 1997	10	4	11	2	1	5	3	4	4	1	0.15
Friman P. C., et al., 1997	10	5	11	2	1	5	3	4	4	1	-0.18
Friman P. C., et al., 1997	10	6	7	2	1	5	3	4	4	1	0.97
Haydon T., et al., 2009	11	1	11	3	1	9	3	1	4	1	3.13

Table 13. Continued

Source	Sty	Sub ID	Diag	Int	Ncmp	T X	FBA/ FA	Set	Imp	Art	Zscr
Greene L., et al., 1999	12	1	1	3	1	8	3	2	3	1	0.79
Greene L., et al., 1999	12	2	11	3	1	8	3	2	3	1	0.14
Greene L., et al., 1999	12	3	11	3	1	8	3	2	3	1	1
Greene L., et al., 1999	12	4	11	3	1	8	3	2	3	1	1.48
Connis R. T., et al., 1980	13	1	6	2	1	5	3	1	2	1	0.59
Connis R. T., et al., 1980	13	2	6	2	1	5	3	1	2	1	0.36
Ducharme J. M., et al., 2007	14	1	11	1	1	2	3	2	3	1	3.12
Ducharme J. M., et al., 2007	14	2	11	1	1	2	3	2	3	1	2.99
Ducharme J. M., et al., 2007	14	3	11	1	1	2	3	2	3	1	3.75
Ducharme J. M., et al., 2001	15	1	11	1	1	2	3	2	3	1	3.11
Ducharme J. M., et al., 2001	15	2	11	1	1	2	3	2	3	1	2.9
Benoit D. A., et al., 2001	16	1	2	1	7	4	3	2	3	1	4.43
Benoit D. A., et al., 2001	16	2	11	1	7	4	3	2	3	1	1.76
Austin J. L., et al., 2005	17	1	11	1	1	2	3	1	4	1	1.89
Austin J. L., et al., 2005	17	2	11	1	1	2	3	1	4	1	1.23
Austin J. L., et al., 2005	17	3	11	1	1	2	3	1	4	1	1.27
Austin J. L., et al., 2005	17	4	11	1	1	2	3	1	4	1	0.11
Davis C. A., et al., 2000	18	1	11	1	1	1	1	1	4	1	9.41
Davis C. A., et al., 2000	18	2	12	1	1	1	1	1	4	1	4.47
Pailthorpe W. K., et al., 1998	19	1	11	2	1	7	1	2	1	1	2.15

Table 13. Continued

Source	Sty	Sub ID	Diag	Int	Ncmp	T X	FBA/ FA	Set	Imp	Art	Zscr
Danforth J. S., 1999	20	1	12	3	1	8	1	3	3	1	3.57
Danforth J. S., 1999	20	2	12	3	1	8	1	3	3	1	3.53
Brown J. F., et al., 2002	21	1	11	1	1	1	3	2	3	1	2.06
Ducharme J. M., et al., 2004	22	1	11	1	1	2	3	2	3	1	2.7
Ducharme J. M., et al., 2004	22	2	11	1	1	2	3	2	3	1	3
Danforth J. S., 2001	23	1	12	1	1	4	3	3	3	1	1.14
Danforth J. S., 2001	23	2	12	1	1	4	3	3	3	1	1.11
Ducharme J. M., et al., 2002	24	1	11	1	1	2	3	2	3	1	5.1
Ducharme J. M., et al., 2002	24	2	11	1	1	2	3	2	3	1	4.41
Ducharme J. M., et al., 2002	24	3	11	1	1	2	3	2	3	1	2.26
Ducharme J. M., et al., 2002	24	4	11	1	1	2	3	2	3	1	2.19
Ducharme J. M., et al., 2002	24	5	11	1	1	2	3	2	3	1	3.02
Ducharme J. M., et al., 2002	24	6	11	1	1	2	3	2	3	1	4.14
Ducharme J. M., et al., 2002	24	7	11	1	1	2	3	2	3	1	3.18
Ducharme J. M., et al., 2002	24	8	11	1	1	2	3	2	3	1	4.09
Ducharme J. M., et al., 2002	24	9	11	1	1	2	3	2	3	1	1.74
Ducharme J. M., et al., 2002	24	10	11	1	1	2	3	2	3	1	3.3
Ducharme J. M., et al., 2002	24	11	11	1	1	2	3	2	3	1	1.89

Table 13. Continued

Source	Sty	Sub ID	Diag	Int	Ncmp	T X	FBA/ FA	Set	Imp	Art	Zscr
Ducharme J. M., et al., 2002	24	12	11	1	1	2	3	2	3	1	2.2
Gmeinder K. L., et al., 1998	25	1	11	3	1	8	3	2	3	1	2.19
Gmeinder K. L., et al., 1998	25	2	11	3	1	8	3	2	3	1	-0.1
Gmeinder K. L., et al., 1998	25	3	11	3	1	8	3	2	3	1	2.23
Belfiore P. J., et al., 2008	26	1	12	1	3	1	3	1	4	1	8.09
Bourn D. F., 1993	27	1	11	3	1	8	2	2	3	1	6.82
Ducharme J. M., et al., 2001	28	1	11	1	1	4	3	2	3	1	3.07
Everett G. E., et al., 2005	29	1	11	1	1	3	3	3	3	1	2.18
Everett G. E., et al., 2005	29	2	11	1	1	3	3	3	3	1	2.39
Everett G. E., et al., 2005	29	3	11	1	1	3	3	3	3	1	3.01
Everett G. E., et al., 2005	29	4	1	1	1	3	3	3	3	1	3.26
Ducharme J. M., et al., 2004	30	1	5	1	1	2	3	2	3	1	3
Ducharme J. M., et al., 2004	30	2	5	1	1	2	3	2	3	1	5.64
Ducharme J. M., et al., 2004	30	3	5	1	1	2	3	2	3	1	1.98
Ducharme J. M., et al., 2004	30	4	5	1	1	2	3	2	3	1	3.42
Humm S. P., et al., 2005	31	1	6	1	1	1	3	2	3	1	1.55
Humm S. P., et al., 2005	31	2	6	1	1	1	3	2	3	1	1.69

Table 13. Continued

Source	Sty	Sub ID	Diag	Int	Ncmp	T X	FBA/ FA	Set	Imp	Art	Zscr
Humm S. P., et al., 2005	31	3	6	1	1	1	3	2	3	1	1.16
Davis C. A., et al., 1992	32	1	6	1	1	1	3	1	4	1	25.05
Davis C. A., et al., 1992	32	2	12	1	1	1	3	1	4	1	27.81
Jung S., et al., 2008	33	1	5	1	1	1	3	1	4	1	2.77
Jung S., et al., 2008	33	2	5	1	1	1	3	1	4	1	3.39
Jung S., et al., 2008	33	3	5	1	1	1	3	1	4	1	2.25
Boelter E. W., et al., 2007	34	1	1	1	1	4	3	3	1	1	1.29
Boelter E. W., et al., 2007	34	2	1	1	1	4	3	3	1	1	1.22
Ardoin S. P., et al., 1999	35	1	11	1	1	1	3	1	4	1	3.53
Ardoin S. P., et al., 1999	35	2	11	1	1	1	3	1	4	1	1.23
Ardoin S. P., et al., 1999	35	3	11	1	1	1	3	1	4	1	0.13
Doll B., et al., 1992	36	1	11	3	1	8	3	2	3	1	1.04
Bullock C., et al., 2006	37	1	11	1	1	1	3	2	1	1	3.89
Bullock C., et al., 2006	37	2	11	1	1	1	3	2	1	1	2.12
O'Reilly D., et al., 2000	38	1	11	2	1	7	3	2	3	1	2.96
O'Reilly D., et al., 2000	38	2	11	2	1	7	3	2	3	1	1.89
O'Reilly D., et al., 2000	38	3	11	2	1	7	3	2	3	1	0.85
Ducharme J. M., et al., 2003	39	1	6	1	1	2	3	2	3	1	1.98
Ducharme J. M., et al., 2003	39	2	6	1	1	2	3	2	3	1	0.92
Ducharme J. M., et al., 2003	39	3	6	1	1	2	3	2	3	1	2.72
Ducharme J. M., et al., 2003	39	4	6	1	1	2	3	2	3	1	2.51

Table 13. Continued

Source	Sty	Sub ID	Diag	Int	Ncmp	T X	FBA/ FA	Set	Imp	Art	Zscr
Kodak T., et al., 2003	40	1	5	2	1	5	3	2	1	1	2.13
Kodak T., et al., 2003	40	2	5	2	1	5	3	2	1	1	1.15
Killu K., et al., 1998	41	1	6	1	1	1	3	1	1	1	1.45
Killu K., et al., 1998	41	2	6	1	1	1	3	1	1	1	4.86
Killu K., et al., 1998	41	3	12	1	1	1	3	1	1	1	3.03
Calpin J. P., et al., 1980	42	1	11	3	1	10	3	3	1	1	3.66
Binnendyk L., et al., 2009	43	1	5	3	1	8	1	2	1	1	6.54
Neidert P. L., et al., 2005	44	1	6	2	1	5	2	3	1	1	1.7
Neidert P. L., et al., 2005	44	2	5	2	1	5	2	3	1	1	1.19
Freeman K. A., et al., 1998	46	1	12	2	1	6	3	4	1	1	8.75
Hamlet C. C., et al., 1984	47	1	11	1	1	3	3	1	4	1	5.91
Hamlet C. C., et al., 1984	47	2	11	1	1	3	3	1	4	1	5.66
Davis C. A., et al., 1996	48	1	11	1	1	1	3	1	4	1	7.87
Davis C. A., et al., 1996	48	2	11	1	1	1	3	1	4	1	5.4
Davis C. A., et al., 1996	48	3	11	1	1	1	3	1	4	1	4.51
Davis C. A., et al., 1996	48	4	11	1	1	1	3	1	4	1	5.69
Ahearn W. H., et al., 1996	49	1	6	2	1	5	3	4	1	1	1.65
Ahearn W. H., et al., 1996	49	2	6	2	1	5	3	4	1	1	3.85
Ahearn W. H., et al., 1996	49	3	11	2	1	5	3	4	1	1	4.63
Marchant M., et al., 2004	50	1	6	3	1	8	3	2	3	1	2.78

Table 13. Continued

Source	Sty	Sub ID	Diag	Int	Ncmp	T X	FBA/ FA	Set	Imp	Art	Zscr
Marchant M., et al., 2004	50	2	6	3	1	8	3	2	3	1	5.16
Marchant M., et al., 2004	50	3	6	3	1	8	3	2	3	1	3.21
Marchant M., et al., 2004	50	4	11	3	1	8	3	2	3	1	2.59
Everett G. E., et al., 2007	51	1	11	2	1	7	1	3	3	1	1.94
Everett G. E., et al., 2007	51	2	11	2	1	7	1	3	3	1	2.93
Everett G. E., et al., 2007	51	3	11	2	1	7	1	3	3	1	4.31
Everett G. E., et al., 2007	51	4	11	2	1	7	1	3	3	1	3.86
Mathes M. Y., et al., 1997	52	1	1	3	1	10	3	1	4	1	12.92
Mathes M. Y., et al., 1997	52	2	1	3	1	10	3	1	4	1	4.48
Mathes M. Y., et al., 1997	52	3	1	3	1	10	3	1	4	1	2.51
Marcus B. A., et al., 1995	53	1	6	2	1	5	2	1	1	1	1.13
Ford A. D., et al., 2001	54	1	11	2	1	7	3	1	4	1	3.19
Ford A. D., et al., 2001	54	2	11	2	1	7	3	1	4	1	4.98
Ford A. D., et al., 2001	54	3	11	2	1	7	3	1	4	1	6.19
Ford A. D., et al., 2001	54	4	11	2	1	7	3	1	4	1	7.24
Mace F. C., et al., 1997	55	1	12	1	1	1	3	3	1	1	1.45
Mace F. C., et al., 1997	55	2	12	1	1	1	3	3	1	1	1.44
Houlihan D., et al., 1994	56	1	5	1	1	1	3	1	2	1	2.25

Table 13. Continued

Source	Sty	Sub ID	Diag	Int	Ncmp	TX	FBA/FA	Set	Imp	Art	Zscr
Ducharme J. M., et al., 1993	57	1	6	1	1	2	3	2	3	1	2.6
Ducharme J. M., et al., 1993	57	2	6	1	1	2	3	2	3	1	3.22
Ducharme J. M., et al., 1993	57	3	6	1	1	2	3	2	3	1	5.95
Ducharme J. M., et al., 1993	57	4	6	1	1	2	3	2	3	1	3.52
Cataldo M. F., et al., 1986	58	1	11	2	1	5	3	4	1	1	0.46
Cataldo M. F., et al., 1986	58	2	11	2	1	5	3	4	1	1	0.43
Cataldo M. F., et al., 1986	58	3	11	2	1	5	3	4	1	1	1
Cataldo M. F., et al., 1986	58	4	6	2	1	5	3	4	1	1	2.82
Ducharme J. M., et al., 2002	59	1	11	1	1	2	3	2	3	1	2.43
Ducharme J. M., et al., 2002	59	2	11	1	1	2	3	2	3	1	1.5
Ducharme J. M., et al., 2002	59	3	11	1	1	2	3	2	3	1	0.71
McDonald M. R., et al., 1983	60	1	6	3	1	8	3	2	3	1	1.79
O'Brien T. P., et al., 1983	61	1	11	3	1	10	3	2	3	1	1.84
Kodak T., et al., 2003	62	1	12	2	1	5	2	2	1	1	1.37
Kennedy C. H., et al., 1995	63	1	11	1	1	1	3	3	1	1	4.85
Kennedy C. H., et al., 1995	63	2	11	1	1	1	3	3	1	1	4.63

Table 13. Continued

Source	Sty	Sub ID	Diag	Int	Ncmp	T X	FBA/ FA	Set	Imp	Art	Zscr
Marchant M., et al., 2001	64	1	11	3	1	8	3	2	3	1	7.48
Marchant M., et al., 2001	64	2	11	3	1	8	3	2	3	1	7.36
Marchant M., et al., 2001	64	3	11	3	1	8	3	2	3	1	3.97
Marchant M., et al., 2001	64	4	11	3	1	8	3	2	3	1	5.24
Ducharme J. M., et al., 1994	65	1	6	1	1	2	3	2	3	1	8.36
Ducharme J. M., et al., 1994	65	2	11	1	1	2	3	2	3	1	5.41
Ducharme J. M., et al., 1994	65	3	12	1	1	2	3	2	3	1	5.35
Ducharme J. M., et al., 1994	65	4	6	1	1	2	3	2	3	1	5.27
Ducharme J. M., et al., 1994	65	5	11	1	1	2	3	2	3	1	3.81
Ducharme J. M., et al., 1994	65	6	6	1	1	2	3	2	3	1	10.13
Adams C. D., et al., 1995	66	1	6	2	1	5	2	2	3	1	3.39
Fowler S. A., 1986	67	1	11	3	1	10	3	1	4	1	5.12
Fowler S. A., 1986	67	2	11	3	1	10	3	1	4	1	3.94
Fowler S. A., 1986	67	3	11	3	1	10	3	1	4	1	1.9
Mackay S., et al., 2001	68	1	6	1	1	4	3	2	3	1	2.44
Olmi D. J., et al., 1997	69	1	6	2	1	7	3	1	1	1	2.15
Johnson T. L., 1994	70	1	11	3	6	9	3	1	4	1	2.39
Lalli J. S., et al., 1994	71	1	6	2	7	7	3	4	1	1	2.55

Table 13. Continued

Source	Sty	Sub ID	Diag	Int	Ncmp	TX	FBA/FA	Set	Imp	Art	Zscr
Lalli J. S., et al., 1994	71	2	6	2	7	7	3	4	1	1	2.46
Mancil G. R., et al., 2009	72	1	5	3	7	10	2	2	3	1	3.13
Mancil G. R., et al., 2009	72	2	5	3	7	10	2	2	3	1	2.75
Mancil G. R., et al., 2009	72	3	5	3	7	10	2	2	3	1	6.79
Sanders M. R., 1982	73	1	11	3	7	8	3	2	3	1	0.91
Sanders M. R., 1982	73	2	11	3	7	8	3	2	3	1	4.01
Musser E. H., et al., 2001	74	1	1	1	1	4	3	1	4	1	6.79
Musser E. H., et al., 2001	74	2	1	1	1	4	3	1	4	1	9.72
Musser E. H., et al., 2001	74	3	1	1	1	4	3	1	4	1	3.17
Banda D. R., et al., 2006	75	1	5	1	7	1	3	1	4	1	0.84
Didomenico J. A., 2003	76	1	11	2	7	5	1	1	1	1	0.57
Didomenico J. A., 2003	76	2	11	2	7	5	1	1	1	1	0.61
Maag J. W., et al., 2006	77	1	2	1	7	4	3	1	4	1	1.24
Maag J. W., et al., 2006	77	2	1	1	7	4	3	1	4	1	2.68
Maag J. W., et al., 2006	77	3	11	1	7	4	3	1	4	1	4.2
Maag J. W., et al., 2006	77	4	11	1	7	4	3	1	4	1	2.98
Maag J. W., et al., 2006	77	5	11	1	7	4	3	1	4	1	3.97
Maag J. W., et al., 2006	77	6	1	1	7	4	3	1	4	1	9.09
Jones M., et al., 2008	78	1	1	2	1	5	3	1	4	1	1.72
Jones M., et al., 2008	78	2	1	2	1	5	3	1	4	1	1.82
Jones M., et al., 2008	78	3	11	2	1	5	3	1	4	1	1.91

Table 13. Continued

Source	Sty	Sub ID	Diag	Int	Ncmp	T X	FBA/ FA	Set	Imp	Art	Zscr
Jones M., et al., 2008	78	4	11	2	1	5	3	1	4	1	1.75
Jones M., et al., 2008	78	5	1	2	1	5	3	1	4	1	0.56
Jones M., et al., 2008	78	6	11	2	1	5	3	1	4	1	0.75
Jones M., et al., 2008	78	7	11	2	1	5	3	1	4	1	0.64
Alevizos K. J., et al., 1975	79	1	11	2	1	7	3	1	4	1	-2.28
Alevizos K. J., et al., 1975	79	2	11	2	1	7	3	1	4	1	-1.69
Alevizos K. J., et al., 1975	79	3	1	2	1	7	3	1	4	1	-1.6
Alevizos K. J., et al., 1975	79	4	11	2	1	7	3	1	4	1	-1.55
Theodore L. A., et al., 2004	80	1	2	2	1	5	3	1	4	1	2.73
Theodore L. A., et al., 2004	80	2	2	2	1	5	3	1	4	1	4.47
Theodore L. A., et al., 2004	80	3	2	2	1	5	3	1	4	1	5.77
Luiselli J. J., 1990	81	1	6	2	1	5	3	4	2	1	1.81
Coleman C. L., et al., 1998	82	1	5	2	7	5	3	3	1	1	4.05
Coleman C. L., et al., 1998	82	2	5	2	7	5	3	3	1	1	2.28
Leve R. M., et al., 2005	84	1	3	2	1	5	1	2	2	1	0.54
Hupp S. D. A., et al., 2008	85	1	2	3	7	8	3	3	3	1	0.4
Dufrene B. A., et al., 2005	86	1	12	2	7	7	3	1	4	1	2.89
Ducharme J. M., et al., 2000	87	1	11	1	1	2	3	2	3	1	2.56

Table 13. Continued

Source	Sty	Sub ID	Diag	Int	Ncmp	T X	FBA/ FA	Set	Imp	Art	Zscr
Ducharme J. M., et al., 2000	87	2	11	1	1	2	3	2	3	1	3.16
Ducharme J. M., et al., 2000	87	3	11	1	1	2	3	2	3	1	2.07
Ducharme J. M., et al., 2000	87	4	11	1	1	2	3	2	3	1	2.86
Ducharme J. M., et al., 2000	87	5	11	1	1	2	3	2	3	1	2.28
Ducharme J. M., et al., 2000	87	6	11	1	1	2	3	2	3	1	3.13
Ducharme J. M., et al., 2000	87	7	11	1	1	2	3	2	3	1	2.75
Ducharme J. M., et al., 2000	87	8	11	1	1	2	3	2	3	1	1.34
Ducharme J. M., et al., 2000	87	9	11	1	1	2	3	2	3	1	3.7
Ducharme J. M., et al., 2000	87	10	11	1	1	2	3	2	3	1	4.14
Ducharme J. M., et al., 2000	87	11	11	1	1	2	3	2	3	1	3.48
Ducharme J. M., et al., 2000	87	12	11	1	1	2	3	2	3	1	2.68
Ducharme J. M., et al., 2000	87	13	11	1	1	2	3	2	3	1	3.29
Ducharme J. M., et al., 2000	87	14	11	1	1	2	3	2	3	1	3.57
Ducharme J. M., et al., 2000	87	15	11	1	1	2	3	2	3	1	2.38
Ducharme J. M., et al., 1996	88	1	6	1	1	2	3	2	3	1	2.45
Ducharme J. M., et al., 1996	88	2	6	1	1	2	3	2	3	1	1.69

Table 13. Continued

	Sty	Sub ID	Diag	Int	Ncmp	T X	FBA/ FA	Set	Imp	Art	Zscr
Ducharme J. M., et al., 1996	88	3	6	1	1	2	3	2	3	1	3.88
Ducharme J. M., et al., 1996	88	4	6	1	1	2	3	2	3	1	4.8
Ducharme J. M., et al., 1996	88	5	6	1	1	2	3	2	3	1	2.78
Lalli J. S., et al., 1999	89	1	12	2	7	5	2	3	1	1	0.45
Lalli J. S., et al., 1999	89	2	11	2	7	5	2	3	1	1	1.44
Lalli J. S., et al., 1999	89	3	6	2	7	5	2	3	1	1	1.05
Beard K. Y., et al., 2004	90	1	11	3	7	9	3	1	4	1	3.41
Davies S., et al., 2000	91	1	1	2	7	5	3	1	4	1	3.58
Davies S., et al., 2000	91	2	1	2	7	5	3	1	4	1	3.4
Davies S., et al., 2000	91	3	1	2	7	5	3	1	4	1	3.36
Davies S., et al., 2000	91	4	1	2	7	5	3	1	4	1	4.37
Neef N. A., et al., 1983	92	1	5	1	7	4	3	1	1	1	1.85
McGrath M. L., et al., 1987	93	1	1	2	7	5	3	2	3	1	1.63
McGrath M. L., et al., 1987	93	2	11	2	7	5	3	2	3	1	0.97
Mandal R. L., et al., 2000	94	1	11	1	7	4	3	3	1	1	2.23
Mandal R. L., et al., 2000	94	2	11	1	7	4	3	3	1	1	3.96
Mandal R. L., et al., 2000	94	3	11	1	7	4	3	3	1	1	6.21
Mandal R. L., et al., 2000	94	4	11	1	7	4	3	3	1	1	2.58
Lees D. G., et al., 2008	95	1	1	3	7	8	3	2	3	1	1.41

Table 13. Continued

Source	Sty	Sub ID	Diag	Int	Ncmp	T X	FBA/ FA	Set	Imp	Art	Zscr
Lees D. G., et al., 2008	95	2	1	3	7	8	3	2	3	1	0.31
Lees D. G., et al., 2008	95	3	1	3	7	8	3	2	3	1	0.93
Bucher B., et al., 1979	96	1	11	2	5	5	3	2	3	1	1.25
Nikopoulos C. K., et al., 2009	97	1	5	1	7	3	3	1	1	1	7.12
Nikopoulos C. K., et al., 2009	97	2	5	1	1	3	3	1	1	1	4.66
Nikopoulos C. K., et al., 2009	97	3	5	1	7	3	3	1	1	1	1.9
McCain A. P., et al., 1994	98	1	11	2	7	7	3	1	4	1	0.17
McCain A. P., et al., 1994	98	2	11	2	7	7	3	1	4	1	-0.02
Peck E., et al., 1999	99	1	11	1	7	4	1	1	2	1	2.71
Ingvarsson E. T., et al., 2008	100	1	12	2	1	5	3	3	1	1	3.16
Cameron M. J., et al., 1992	101	1	6	2	1	7	3	4	2	1	0
Resick P. A., et al., 1976	102	1	11	2	1	7	3	2	3	1	2.35
Resick P. A., et al., 1976	102	2	11	2	7	7	3	2	3	1	2.22
Marlow A. G., et al., 1997	103	1	5	2	7	7	3	1	4	1	2.98
Marlow A. G., et al., 1997	103	2	12	2	7	7	3	1	4	1	3.17
Painter L. T., et al., 1999	104	1	11	3	7	8	3	3	1	1	1
Painter L. T., et al., 1999	104	2	11	3	7	8	3	3	1	1	2.25
Painter L. T., et al., 1999	104	3	11	3	7	8	3	3	1	1	0.84
Painter L. T., et al., 1999	104	4	11	3	7	8	3	3	1	1	1.81

Table 13. Continued

Source	Sty	Sub ID	Diag	Int	Ncmp	T X	FBA/ FA	Set	Imp	Art	Zscr
Little L. M., et al., 1989	105	1	11	2	7	7	3	2	3	1	3.26
Little L. M., et al., 1989	105	2	1	2	7	7	3	2	3	1	5.64
Van Hasselt V. B., et al., 1987	106	1	6	3	1	8	3	3	3	1	3.22
Shapiro E. S., et al., 1986	107	1	6	2	1	5	3	1	4	1	4.62
Slifer K. J., et al., 1986	108	1	6	2	1	7	3	4	1	1	1.48
Russell D., et al., 1998	109	1	11	3	7	8	3	2	3	1	1.74
Russell D., et al., 1998	109	2	11	3	7	8	3	2	3	1	1.94
Sisson L. A., et al., 1988	110	1	6	2	1	5	3	1	2	1	1.94
Bellipanni K. D., 2006	111	1	11	1	5	1	3	1	4	2	4.27
Bellipanni K. D., 2006	111	2	11	1	5	1	3	1	4	2	5.09
Bellipanni K. D., 2006	111	3	11	1	5	1	3	1	4	2	3.05
Bellipanni K. D., 2006	111	4	11	1	5	1	3	1	4	2	5.64
Yeager C., et al., 1995	112	1	11	1	5	4	3	1	4	1	2.41
Wasserman T. H., 1977	113	1	11	2	1	5	3	4	1	1	-8.07
Swenson N., et al., 2000	114	1	1	2	4	5	3	1	2	1	3.33
Umbreit J., et al., 1997	115	1	11	2	1	5	2	1	4	1	21.97
Workman E. A., et al., 1982	116	1	11	3	7	10	3	1	2	1	0.89
Robinson K. E., et al., 2000	117	1	11	2	1	5	3	2	3	1	4.62
Robinson K. E., et al., 2000	117	2	11	2	6	5	3	2	3	1	-0.04
Robinson K. E., et al., 2000	117	3	11	2	7	5	3	2	3	1	3.5
Robinson K. E., et al., 2000	117	4	11	2	7	5	3	2	3	1	3.4

Table 13. Continued

Source	Sty	Sub ID	Diag	Int	Ncmp	T X	FBA/ FA	Set	Imp	Art	Zscr
Wehman P., et al., 1977	118	1	6	2	7	7	3	4	2	1	1.75
Fleece L., et al., 1981	119	1	11	3	1	9	3	1	4	1	0.92
Handen B. L., et al., 1992	120	1	6	2	7	5	3	3	1	1	0.56
Handen B. L., et al., 1992	120	2	6	2	7	5	3	3	1	1	0.01
Handen B. L., et al., 1992	120	3	6	2	7	5	3	3	1	1	1.33
Russo D. C., et al., 1981	121	1	11	2	7	5	3	3	1	1	2.92
Russo D. C., et al., 1981	121	2	6	2	7	5	3	3	1	1	2.28
Roane H. S., et al., 2008	122	1	6	2	7	5	3	3	1	1	2
Wilder D. A., et al., 2008	123	1	5	1	7	1	3	1	2	1	1.88
Wilder D. A., et al., 2008	123	2	5	1	7	1	3	2	2	1	0.98
Wilder D. A., et al., 2008	123	3	11	1	7	1	3	1	2	1	1.38
Whitman T. L., et al., 1971	124	1	6	2	7	5	3	4	1	1	0.44
Tarbox R. S. F., et al., 2007	125	1	1	1	7	1	3	2	2	1	0.67
Tarbox R. S. F., et al., 2007	125	2	5	1	7	1	3	2	2	1	1.31
Wilder D. A., et al., 2006	126	1	11	1	7	1	3	2	3	1	3.69
Wilder D. A., et al., 2006	126	2	11	1	7	1	3	1	2	1	3.85
Wilder D. A., et al., 2006	126	3	11	1	7	1	3	2	3	1	4.49
Wilder D. A., et al., 2006	126	4	11	1	7	1	3	1	4	1	2.24

Table 13. Continued

Source	Sty	Sub ID	Diag	Int	Ncmp	T X	FBA/ FA	Set	Imp	Art	Zscr
Wilder D. A., et al., 2006	126	5	11	1	7	1	3	1	4	1	3.81
Wilder D. A., et al., 2006	126	6	11	1	7	1	3	1	2	1	4.26
Romano J. P., et al., 2000	127	1	12	1	7	1	3	4	2	1	5.26
Romano J. P., et al., 2000	127	2	6	1	7	1	3	4	2	1	3.27
Romano J. P., et al., 2000	127	3	6	1	7	1	3	4	2	1	1.48
Wilder D. A., et al., 2007	128	1	11	2	1	5	3	1	1	1	6.29
Wilder D. A., et al., 2007	128	2	11	2	1	5	3	1	1	1	5.85
Wilder D. A., et al., 2007	129	1	11	1	1	1	2	2	2	1	0.52
Wilder D. A., et al., 2007	129	2	11	1	1	1	2	1	2	1	0.52
Wilder D. A., et al., 2007	129	3	11	1	1	1	2	1	2	1	0.99
Smith M. R., et al., 1999	131	1	6	1	7	1	3	2	3	1	1.98
Zuluaga C. A., et al., 2008	132	1	11	1	7	1	3	2	1	1	1.17
Zuluaga C. A., et al., 2008	132	2	11	1	7	1	3	2	1	1	0.92
Rortvedt A. K., et al., 1994	133	1	11	1	7	1	3	2	3	1	10.61
Rortvedt A. K., et al., 1994	133	2	11	1	7	1	3	2	3	1	2.46
Sharp W. G., et al., 2009	134	1	12	1	7	3	3	3	1	1	-1.23
Mildon R. L., et al., 2004	135	1	5	2	1	5	2	2	1	1	3.66

Table 13. Continued

Source	Sty	Sub ID	Diag	Int	Ncmp	T X	FBA/ FA	Set	Imp	Art	Zscr
Zimmerman E. H., et al., 1969	136	1	6	2	7	5	3	4	2	1	1.44
Zimmerman E. H., et al., 1969	136	2	12	2	7	5	3	4	2	1	2.68
Zimmerman E. H., et al., 1969	136	3	6	2	7	5	3	4	2	1	2.87
Zimmerman E. H., et al., 1969	136	4	12	2	7	5	3	4	2	1	2.51
Zimmerman E. H., et al., 1969	136	5	6	2	7	5	3	4	2	1	0.74
Zimmerman E. H., et al., 1969	136	6	6	2	7	5	3	4	2	1	0.81
McComas J. J., et al., 2000	137	1	11	1	1	1	2	4	1	1	2.32
Houlihan D., et al., 1990	138	1	11	2	1	5	3	1	1	1	0.65
Houlihan D., et al., 1990	138	2	11	2	1	5	3	1	1	1	0.92
Houlihan D., et al., 1990	138	3	11	2	1	5	3	1	1	1	0.67
Wahler R. G., et al., 2004	139	1	11	3	7	8	3	2	1	1	1.41
Singh N. N., et al., 2006	140	1	5	3	7	8	3	3	1	1	2.91
Singh N. N., et al., 2006	140	2	5	3	7	8	3	3	1	1	1.71
Roberts D. S., et al., 2008	141	1	11	1	7	4	3	3	1	1	9.57
Roberts D. S., et al., 2008	141	2	11	1	7	4	3	3	1	1	4.97
Roberts D. S., et al., 2008	141	3	6	1	7	4	3	3	1	1	8.44
Roberts D. S., et al., 2008	141	4	11	1	7	4	3	3	1	1	5
Shaw R., et al., 2009	142	1	12	2	1	5	1	1	4	1	3.65

Table 13. Continued

Source	Sty	Sub ID	Diag	Int	Ncmp	T X	FBA/ FA	Set	Imp	Art	Zscr
Shaw R., et al., 2009	142	2	6	2	7	5	1	1	4	1	8.19
Shaw R., et al., 2009	142	3	6	2	7	5	1	1	4	1	2.9
Wilkinson L., 2005	143	1	12	2	7	5	3	1	4	1	3.91
Wilkinson L. A., 2005	144	1	12	2	7	5	2	1	4	1	3.91
Wilkinson L. A., 2005	144	2	12	2	7	5	2	1	4	1	4.54
Peyton R. T., et al., 2005	146	1	5	1	3	4	2	3	3	1	5.551 12E-17
Patterson S. T. , et al., 2009	147	1	11	2	7	5	1	1	4	1	4.62
Piazza C. C., et al., 1996	148	1	12	2	1	5	2	4	2	1	1.86
Gresham F. M., 1983	149	1	6	2	1	5	3	1	4	1	1.96
Doll B., et al., 1992	150	1	11	3	1	8	3	2	3	1	1.05
Kolko D. J., 1987	151	1	12	3	7	10	3	4	2	1	4.49
Kolko D. J., 1987	151	2	12	3	7	10	3	4	2	1	3.01
Kolko D. J., 1987	151	3	12	3	7	10	3	4	2	1	2.69
Kolko D. J., 1987	151	4	12	3	7	10	3	4	2	1	3.55
Kolko D. J., 1987	151	5	12	3	7	10	3	4	2	1	5.11
Kolko D. J., 1987	151	6	12	3	7	10	3	4	2	1	5.2
Nangle D. W., et al., 1994	152	1	1	3	1	8	3	2	3	1	0.74
Harding J. W., et al., 2002	153	1	12	3	1	10	2	2	3	1	0.39
Harding J. W., et al., 2002	153	2	12	3	1	10	2	2	3	1	0.62
Johnson C. M., et al., 1989	154	1	1	2	7	5	3	2	3	1	0.85
Cormier E., 2004	155	1	12	3	1	8	2	2	2	2	22.01

Table 13. Continued

Source	Sty	Sub ID	Diag	Int	Ncmp	T X	FBA/ FA	Set	Imp	Art	Zscr
Cormier E., 2004	155	2	12	3	1	8	2	2	2	2	24.86
Cormier E., 2004	155	3	12	3	1	8	2	2	2	2	-0.13
Hupp S. D. A., 2003	156	1	2	3	1	8	3	3	2	2	1.81
Hupp S. D. A., 2003	156	2	2	3	1	8	3	3	2	2	1.14
Mahlberg T. L., 1997	158	1	11	1	7	4	3	3	2	2	0.64
Munneke D. M., 2001	159	1	11	3	7	8	3	3	1	2	5.64
Munneke D. M., 2001	159	2	11	3	7	8	3	3	1	2	3.2
Munneke D. M., 2001	159	3	11	3	7	8	3	3	1	2	4.15
Bellipanni K. D., 2006	160	1	11	1	5	4	3	3	1	2	6.71
Bellipanni K. D., 2006	160	2	6	1	5	4	3	3	1	2	7.31
Bellipanni K. D., 2006	160	3	11	1	5	4	3	3	1	2	5.81
Bellipanni K. D., 2006	160	4	11	1	5	4	3	3	1	2	6.55
Ringeisen H. L., 2000	161	1	1	2	6	5	3	3	1	2	-0.31
Ringeisen H. L., 2000	161	2	1	2	1	5	3	3	1	2	0.18
Ringeisen H. L., 2000	161	3	1	2	1	5	3	3	1	2	0.55
Ringeisen H. L., 2000	161	4	1	2	5	5	3	3	1	2	0.98
Foster N. R., 2005	162	1	11	1	5	4	2	3	1	2	9.24
Foster N. R., 2005	162	2	11	1	5	4	2	3	1	2	3.66
Foster N. R., 2005	162	3	11	1	5	4	2	3	1	2	3.05
Foster N. R., 2005	162	4	11	1	5	4	2	3	1	2	2.71
Alterson C. J., 2000	163	1	12	1	1	4	2	4	1	2	2.38
Alterson C. J., 2000	163	2	12	1	5	4	2	4	1	2	2.56
Tennapel S. A., 1998	164	1	12	1	5	1	1	1	2	2	2.43
Tennapel S. A., 1998	164	2	12	1	5	1	1	1	2	2	2.3

Table 13. Continued

Source	Sty	Sub ID	Diag	Int	Ncmp	T X	FBA/ FA	Set	Imp	Art	Zscr
Tennapel S. A., 1998	164	3	12	1	5	1	1	1	1	2	1.67
Tennapel S. A., 1998	164	4	12	1	5	1	1	1	2	2	0.96
Killu K., 1996	165	1	11	1	1	1	3	1	1	2	1.82
Killu K., 1996	165	2	11	1	1	1	3	1	1	2	4.73
Killu K., 1996	165	3	5	1	1	1	3	1	1	2	3.2
Dawson J. E., 2001	166	1	11	1	3	1	1	3	1	2	0.43
Dawson J. E., 2001	166	2	11	1	3	1	1	3	1	2	5.76
Dawson J. E., 2001	166	3	11	1	3	1	1	3	1	2	3.25
Mandal R. L., 2002	167	1	11	1	5	4	3	3	3	2	3.73
Mandal R. L., 2002	167	2	11	1	5	4	3	3	3	2	1.98
Mandal R. L., 2002	167	3	11	1	5	4	3	3	3	2	0.46
Mandal R. L., 2002	167	4	11	1	5	4	3	3	3	2	1.88
Maus M., 2007	168	1	12	2	7	5	2	1	4	2	0.23
Maus M., 2007	168	2	12	2	7	5	2	1	4	2	1.83
Maus M., 2007	168	3	12	2	7	5	2	1	4	2	2.84
Maus M., 2007	168	4	12	2	7	5	2	1	4	2	0.77
Maus M., 2007	168	5	5	2	7	5	2	1	4	2	2.15
Maus M., 2007	168	6	12	2	7	5	2	1	4	2	0.13
Maus M., 2007	168	7	5	2	7	5	2	1	4	2	1.9
Mills M. A., 2001	169	1	12	2	1	5	3	4	1	2	0.78
Mills M. A., 2001	169	2	12	2	6	5	3	4	1	2	1.69
Mills M. A., 2001	169	3	12	2	6	5	3	4	1	2	2.59
Floress M. T., 2008	170	1	11	3	5	9	3	1	1	2	1.31
Floress M. T., 2008	170	2	11	3	5	9	3	1	1	2	-0.17

Table 13. Continued

Source	Sty	Sub ID	Diag	Int	Ncmp	T X	FBA/ FA	Set	Imp	Art	Zscr
Floress M. T., 2008	170	3	11	3	5	9	3	1	1	2	0.03
Jamison T. R., 2008	171	1	5	1	5	4	3	3	1	2	0.74
Jamison T. R., 2008	171	2	5	1	5	4	3	3	1	2	0.41
Jamison T. R., 2008	171	3	5	1	5	4	3	3	1	2	1.13
Ebanks M. E., 2007	172	1	11	1	1	4	2	3	3	2	1.01
Ebanks M. E., 2007	172	2	11	1	1	4	2	3	3	2	-0.86
Ebanks M. E., 2007	172	3	11	1	6	4	2	3	3	2	0.96
Ebanks M. E., 2007	172	4	11	1	6	4	2	3	3	2	2.15
Ebanks M. E., 2007	172	5	11	1	5	4	2	3	3	2	2.68
Ebanks M. E., 2007	172	6	11	1	6	4	2	3	3	2	-0.37
Ware L. M., 2008	173	1	11	1	5	4	3	2	1	2	0
Ware L. M., 2008	173	2	11	1	1	4	3	2	1	2	2.74
Ware L. M., 2008	173	3	11	1	1	4	3	2	1	2	1.91
Nielsen S. L., 2002	174	1	11	1	1	4	1	1	4	2	7.14
Nielsen S. L., 2002	174	2	11	1	1	4	1	1	1	2	12.48
Nielsen S. L., 2002	174	3	6	1	1	1	1	2	4	2	2.44
Ward R. R. Jr., 2000	175	1	1	1	5	4	3	3	4	2	4.07
Ward R. R. Jr., 2000	175	2	1	1	5	4	3	3	4	2	5.17
Ward R. R. Jr., 2000	175	3	12	1	5	4	3	3	4	2	1.81
Ward R. R. Jr., 2000	175	4	1	1	5	4	3	3	4	2	10.39
Middleton M. B., 1995	176	1	11	1	7	4	3	1	1	2	0.2
Middleton M. B., 1995	176	2	11	1	7	4	3	1	1	2	1.22
Middleton M. B., 1995	176	3	11	1	7	4	3	1	1	2	1.55
Middleton M. B., 1995	176	4	11	1	7	4	3	1	1	2	0.96

Table 13. Continued

Source	Sty	Sub ID	Diag	Int	Ncmp	T X	FBA/ FA	Set	Imp	Art	Zscr
Middleton M. B., 1995	176	5	11	1	7	4	3	1	1	2	0.25
Vidair H. B., 2006	177	1	11	2	5	5	3	2	1	2	0.55
Vidair H. B., 2006	177	2	9	2	5	5	3	2	1	2	-0.98
Vidair H. B., 2006	177	3	9	2	1	5	3	2	1	2	-0.23
Vidair H. B., 2006	177	4	11	2	5	5	3	2	1	2	0.05
Vidair H. B., 2006	177	5	11	2	1	5	3	2	1	2	0.3
Vidair H. B., 2006	177	6	11	2	5	5	3	2	1	2	-0.43
Carrington Rotto P. J., 1994	178	1	11	3	1	8	3	2	3	2	1.49
Carrington Rotto P. J., 1994	178	2	11	3	3	8	3	2	3	2	1.29
Carrington Rotto P. J., 1994	178	3	11	3	1	8	3	2	3	2	1.75
Carrington Rotto P. J., 1994	178	4	11	3	1	8	3	2	3	2	2.13
Carrington Rotto P. J., 1994	178	5	11	3	1	8	3	2	3	2	2.56
Carrington Rotto P. J., 1994	178	6	11	3	1	8	3	2	3	2	1.27
Carrington Rotto P. J., 1994	178	7	11	3	1	8	3	2	3	2	2.28
Muir K. A., 1983	179	1	11	2	1	7	3	1	4	2	4.65
Muir K. A., 1983	179	2	11	2	1	7	3	1	4	2	4.22
Muir K. A., 1983	179	3	11	2	1	7	3	1	4	2	3.06
Muir K. A., 1983	179	4	11	2	1	7	3	1	4	2	1.69
Muir K. A., 1983	179	5	11	2	1	7	3	1	4	2	2.59
Li Z.-H., 2001	180	1	6	1	1	1	3	2	3	2	5.39
Li Z.-H., 2001	180	2	6	1	1	1	3	2	3	2	4.51

Table 13. Continued

Source	Sty	Sub ID	Diag	Int	Ncmp	T X	FBA/ FA	Set	Imp	Art	Zscr
Li Z.-H., 2001	180	3	6	1	1	1	3	2	3	2	4.64
Li Z.-H., 2001	180	4	6	1	1	1	3	2	3	2	9.43
Phaneuf R. L., 2003	181	1	11	1	5	4	3	1	4	2	1.04
Sorensen R. J., 1999	182	1	12	2	1	5	2	4	2	2	1.25
Sorensen R. J., 1999	182	2	12	2	1	5	2	4	2	2	0.43
Sorensen R. J., 1999	182	3	12	2	1	5	2	4	2	2	0.84
Miles S. L., 2003	183	1	12	3	7	8	3	2	2	2	1.34
Miles S. L., 2003	183	2	6	3	5	8	3	2	2	2	1.49
Miles S. L., 2003	183	3	6	3	6	8	3	2	2	2	2.58
Swiezy N. B., et al., 1992	184	1	11	2	5	5	3	1	2	1	4.91
Swiezy N. B., et al., 1992	184	2	12	2	5	5	3	1	2	1	3.89

APPENDIX B

GROUP DESIGN DATA

Table 14. Key: Group Design Data

	Abbreviation		
Source	Source (Article source used in dissertation)		
Study Number	Sty		
Number in Group	# in Gr (Number of Subjects in Experimental Group)		
Diagnosis	Diag	1	ADHD
		2	ODD
		3	CD
		4	Adj. Dis. with Dis. of Conduct
		5	Autism
		6	Mental Retardation
		7	Mood Disorder
		8	Traumatic Brain Injury
		9	Enuresis
		10	Encopresis
		11	Not Specified
		12	Multiple Diagnosis
Intervention Type	Int	1	Manipulation of Antecedent
		2	Manipulation of Consequence
		3	Training: Parent, Teacher, Child
		4	Not Specified
Noncompliance Type	Ncmp	1	Direct Defiance
		2	Passive Noncompliance
		3	Simple Refusal
		4	Negotiation
		5	Slowness to Respond
		6	Whining
		7	Other/Not Specified
Treatment Type	TX	1	Behavior Momentum
		2	Errorless Compliance Training
		3	Nonverbal Behavior
		4	Precision Request/Effective Instruction Delivery
		5	Reinforcement
		6	Extinction
		7	Punishment
		8	Parent Training
		9	Teacher Training
		10	Child Training
		11	Not Specified
Functional Behavior Assessment/Functional Analysis	FBA/FA	1	FBA
		2	FA
		3	Not Specified/None

Table 14. Continued

	Abbreviation		
Setting	Set	1	School
		2	Home
		3	Clinic
		4	Residential/Institution/Hospital
		5	Not Specified
Implementer	Imp	1	Professor/Clinician
		2	Assistant
		3	Parent
		4	Teacher
		5	Other/Not Specified
Article Source	Art	1	Journal Article
		2	Dissertation/Thesis
Effect Size	ES		

Table 15. Group Design Data

Source	Sty	# in Gr	Diag	Int	Ncmp	TX	FBA/FA	Set	Imp	Art	ES
Grizenko N., et al., 1993	1	15	12	3	7	8	0	3	2	1	7.757
Scott S., et al., 2005	2	58	12	3	7	8	0	3	2	1	2.489
Webster-Stratton C., et al., 2001	3	49	12	3	7	8	0	3	1	1	0.426
Pfiffner L. J., et al., 1997	4	9	12	3	7	8	0	3	1	1	0.491
Wade S. L., et al., 2006	5	20	8	3	7	8	0	2	1	1	-0.182
Pisterman S., et al., 1992	6	23	1	2	7	5	0	3	1	1	0.991
Powers S. W., et al., 1995	7	9	2	3	7	8	0	3	1	1	4.124
Plant K. M., et al., 2007	8	24	12	3	7	8	0	3	1	1	0.759
Pisterman S., et al., 1989	9	23	1	3	7	8	0	3	1	1	1.034
Sofronoff K., et al., 2004	10	17	5	3	7	8	0	3	1	1	3.693
McNeil C. B., et al., 1991	11	10	12	2	7	5	0	3	1	1	0.921
Webster-Stratton C., et al., 2001	12	225	12	3	7	9	0	1	2	1	0.233
Reid M. J., et al., 2007	13	131	11	3	7	8	0	1	2	1	4.891
ThorellL. B., 2009	14	25	12	3	7	8	0	3	1	1	0.689
Webster-Stratton C., 1984	15	13	12	3	7	8	0	3	1	1	0.396
Sanders M. R., et al., 2007	16	32	12	3	7	8	0	3	1	1	1.414
Sukhodolsky D. G., et al., 2009	17	13	12	2	1	5	0	3	1	1	0.591

Table 15. Continued

Source	Sty	# in Gr	Diag	Int	Ncmp	TX	FBA/FA	Set	Imp	Art	ES
Roberts M. W., et al., 1981	18	8	11	2	1	5	0	3	1	1	1.021
Webster-Stratton C., 1998	19	264	2	3	7	8	0	1	1	1	0.344
Schuhmann E. M., et al., 1998	20	37	1	2	7	5	0	3	1	1	1.333
Hutchings J., et al., 2002	21	22	3	2	7	5	0	3	5	1	1.374
Larkin R., et al., 1999	22	31	11	3	1	10	0	1	1	1	-1.287
Conduct Problems Prevention Research Group, 1999	23	445	11	3	7	9	0	1	5	1	-0.116
Webster-Stratton C., 1985	24	18	11	3	1	8	0	5	5	1	-0.702
Wahler R. G., et al., 1993	25	7	11	3	1	8	0	3	2	1	1.254
Thompson M. J. J., et al., 2009	26	17	12	3	7	8	0	2	1	1	0.412
Reid M. J., et al., 1999	27	13	11	2	1	6	0	2	3	1	6.873
Nixon R. D. V., et al., 2004	28	22	2	3	7	8	0	3	1	1	0.530
Magen R. H., et al., 1994	29	19	3	3	7	8	0	3	1	1	0.562
McIntyre L. L., 2008	30	24	12	3	7	8	0	3	1	1	0.657
Lynch K. B., et al., 2004	31	230	11	3	7	9	0	1	4	1	0.680
Larsson B., et al., 2009	32	52	12	2	7	5	0	3	1	1	2.819
Koblinsky S. A., et al., 2000	33	38	3	3	7	9	0	1	1	1	1.182

Table 15. Continued

Source	Sty	# in Gr	Diag	Int	Ncmp	TX	FBA/FA	Set	Imp	Art	ES
Kapalka G. M., 2005	34	45	12	3	7	9	0	1	4	1	0.675
Hamilton S. B., et al., 1984	35	9	11	3	3	8	0	2	3	1	-2.054
Kotler J. S., et al., 2004	36	20	11	2	3	5	0	3	1	1	1.013
Landy S., et al., 2006	37	20	11	3	1	8	0	3	1	1	2.071
Ogden T., et al., 2008	38	59	12	3	1	8	0	3	1	1	0.143
Webster-Stratton C., et al., 1997	39	22	12	2	7	5	0	3	1	1	3.334
Martinez C. R., et al., 2001	40	153	11	3	7	8	0	3	2	1	0.743
Matos M., et al., 2009	41	20	12	2	7	5	0	3	1	1	1.971
Niccols A., 2009	42	45	11	3	7	8	0	3	1	1	1.834
Behan J., et al., 2001	43	26	12	3	1	8	0	3	1	1	0.515
Jones K., et al., 2007	44	50	12	3	7	8	0	3	1	1	0.575
Kazdin A. E., et al., 1992	45	37	12	3	1	8	0	3	1	1	0.688
Erford B. T., 1999	46	12	11	3	7	8	0	3	1	1	6.156
Drugli M. B., et al., 2007	47	52	12	4	1	11	0	3	1	1	2.491
Drugli M. B., et al., 2006	48	52	12	4	1	11	0	3	1	1	2.937
Cunningham C. E., et al., 1995	49	48	11	3	7	8	0	5	1	1	1.312
Chacko A., et al., 2009	50	120	12	3	7	8	0	3	1	1	1.718
Bagner D. M., et al., 2007	51	15	12	2	1	5	0	3	1	1	1.136

Table 15. Continued

Source	Sty	# in Gr	Diag	Int	Ncmp	TX	FBA/FA	Set	Imp	Art	ES
Bagner D. M., et al., 2003	52	55	12	3	1	8	0	3	1	1	-3.665
Corkum P. V., et al., 2005	53	14	1	3	7	8	0	2	1	1	1.039
Eyberg S. M., et al., 1995	54	19	12	3	1	8	0	3	1	1	4.842
Kern L., et al., 2007	55	71	12	3	1	8	0	2	5	1	0.606
Kapalka G. M., 2004	56	26	1	3	7	8	0	3	1	1	15.361
Feindler E. L., et al., 1984	57	18	11	2	1	5	0	1	1	1	6.205
Anastopoulos A. D., et al., 1993	58	19	12	3	1	8	0	3	1	1	0.992
Day D. E., et al., 1983	59	8	11	3	7	8	0	3	1	1	-2.265
Kazdin A. E., et al., 1987	60	24	12	2	1	5	0	4	1	1	4.712
McGoey K. E., et al., 2005	61	30	12	3	7	8	0	3	1	1	1.400
Hutchings J., et al., 2007	63	47	3	4	7	11	0	5	5	1	1.470
Quinn M., et al., 2007	64	19	12	4	1	11	0	5	5	1	-0.781
Webster-Stratton C., et al., 2004	65	26	12	4	7	11	0	5	5	1	-0.573
Gardner H. L., et al., 1976	66	8	11	2	5	7	0	3	3	1	2.508
Roberts M. W., 1982	67	8	11	2	7	7	0	3	3	1	0.158
Zangwill W. M., 1983	68	6	11	3	7	8	0	3	1	1	1.399
Fabiano G. A., et al., 2009	69	38	1	3	7	8	0	3	1	1	-0.379

Table 15. Continued

Source	Sty	# in Gr	Diag	Int	Ncmp	TX	FBA/FA	Set	Imp	Art	ES
Tulloch E. A., 1997	70	7	11	3	1	8	0	2	3	2	2.602
Channell M. A., 1997	71	7	1	3	7	8	0	2	3	2	-0.280
Hall T. F., 2003	72	10	1	3	7	8	0	2	3	2	0.567
Rocheleau A. E., 2002	73	8	11	3	7	8	0	2	3	2	-1.361
Bustamante A. M., 2000	74	14	1	3	1	8	0	2	3	2	1.837
Illsley S. D., 2003	75	17	11	3	1	8	2	2	3	2	0.888
Driskill J. D., 2000	76	30	1	3	1	8	0	2	3	2	1.942
Schmelzer Benisz E. R., 2003	77	15	1	3	7	8	0	2	3	2	1.546
Chacko A., 2007	78	35	12	3	7	8	0	2	3	2	3.537
Brockway B. S., 1975	79	6	11	3	1	8	0	2	3	2	4.172
Magin A., 1988	81	8	11	2	7	7	0	2	3	2	0.419

APPENDIX C

CODING SHEET

Coding Sheet – Noncompliance

Article Information

Article Included in Analysis: Y / N If No, Why excluded:_____

Article Number:_____ Subject Number:_____ Group Study Number:_____

Complete citation of article (APA style):

Source: Journal_____ Dissertation_____ Thesis_____

Design and Methodological Analysis

Assignment of Participants: Randomized_____ Nonrandomized_____

Not Applicable_____

Design: Single-subject_____ Between-subjects_____ Within-subjects_____

If Single-Subject: At least 3 points in each phase? Yes_____ No_____

Type of SSD: AB_____ ABA_____ ABAB_____ Multiple Baseline_____

Multitreatment_____ Multiple Probe_____ Other_____

Use of Control Group: Yes_____ No_____ Not Applicable_____

Generalization Reported: Yes_____ No_____ Generalization Time :_____

Reliability Assessment: Yes_____ No_____

Sample Data

Participant Data: # of subjects:_____ Male_____ Female_____

Age Range: Group Study:_____ Age of individual (SSD):_____

Diagnosis: ADHD_____ ODD_____ CD_____ Autism (Asperger's, PDD)_____

Other_____, Co-morbid Condition: Yes_____ No_____ If Yes, What?_____

Intervention Analysis

Pre-treatment Functional Analysis/Assessment performed: Yes_____ No_____

Type: FBA_____ FA_____ Other_____, If Other, What_____

Setting of Intervention: School_____ Clinic_____ Home_____

Residential_____ Unknown_____

Implementer of Treatment: Teacher____ Clinician____ Parent____

Assistant____ Unknown____

Type of Noncompliant Behavior: Direct Defiance_____ Passive Noncompliance____

Simple Refusal____ Negotiation____ Whining____ Slowness to Respond_____

Combined_____ Unknown_____

Type of Treatment: Manipulation of Antecedents____ Manipulation of Behavior____

Manipulation of Consequences_____ Parent Training_____ Teacher Training_____

Teaching New Skills/Direct Instruction_____ Medication_____

Group Contingencies_____

Treatment Components:

Manipulation of Antecedents Type_____

Manipulation of Behavior Type_____

Manipulation of Consequences

*Reinforcing Intervention:*_____

*Extinction Procedure:*_____

*Consequence Procedure:*_____

Parent Training Type_____

Teacher Training Type_____

Teaching New Skills/Direct Instruction Type_____

Medication Type_____

Group Contingencies Type_____

APPENDIX D

INDIVIDUAL DATA POINTS CODING SHEET

Coding Sheet – Individual Data Points

Subject Number_____

1st Baseline Data Points:_____

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

1st Treatment Phase Data Points:_____

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

2nd Baseline Data Points:_____

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

2nd Treatment Phase Data Points:_____

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

3rd Baseline Data Points:_____

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

3rd Treatment Phase Data Points:_____

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

4th Baseline Data Points:_____

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

4th Treatment Phase Data Points:_____

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

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